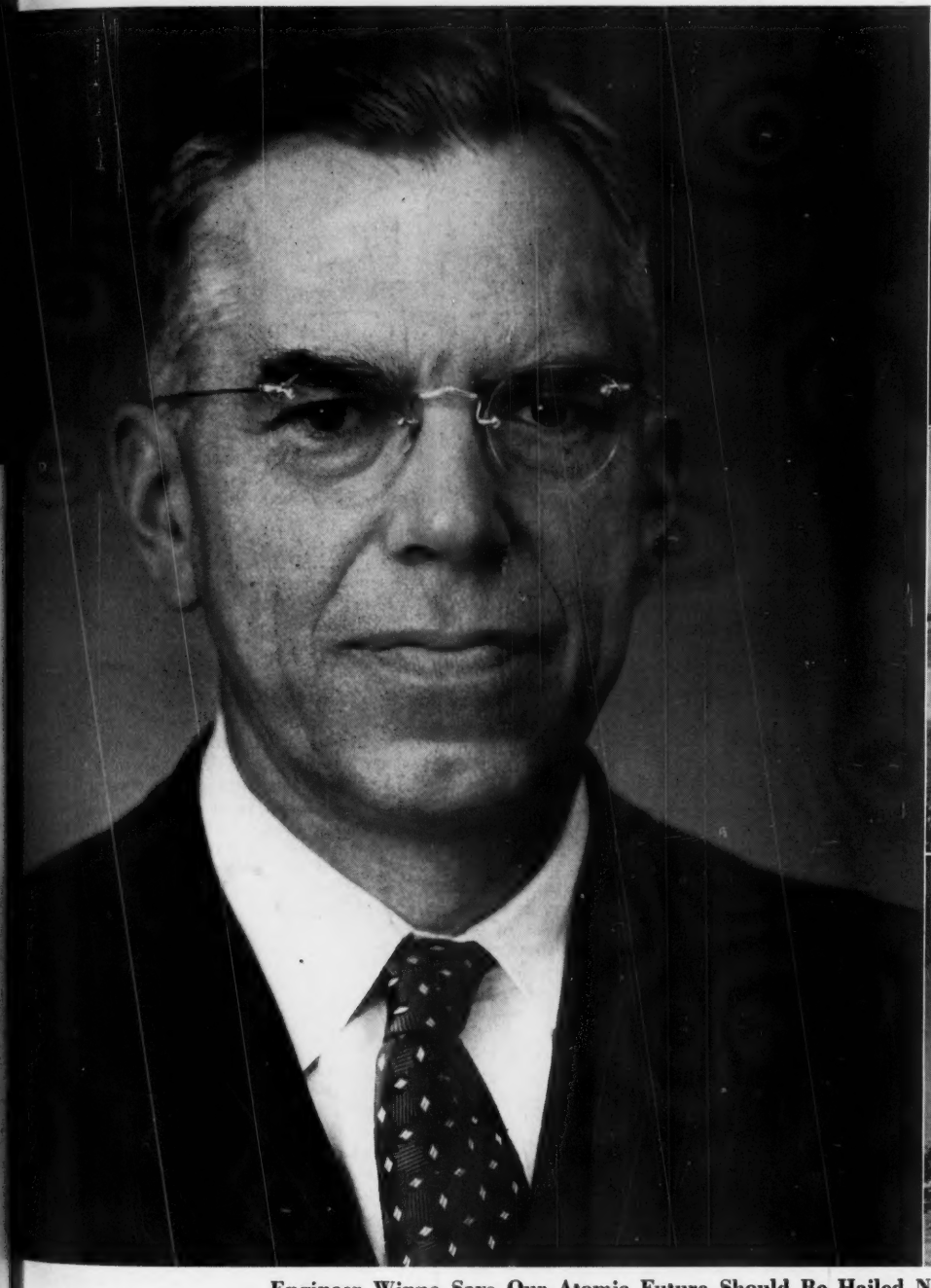
MARCH 1954

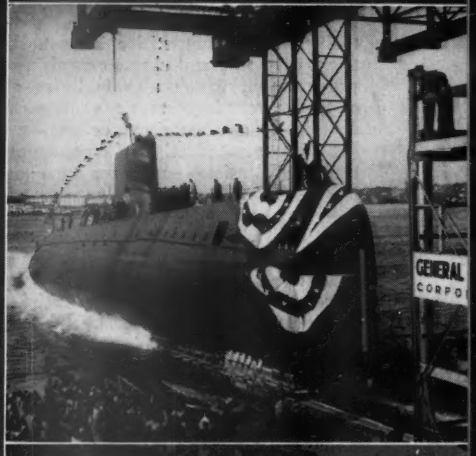
American Engineer

IN THIS ISSUE . . .

- **A DOCTRINE FOR ENGINEERS: THINK BIG, PLAN BIG!**

By Harry A. Winne, P.E.,
Former Vice President—Engineering, General Electric Company





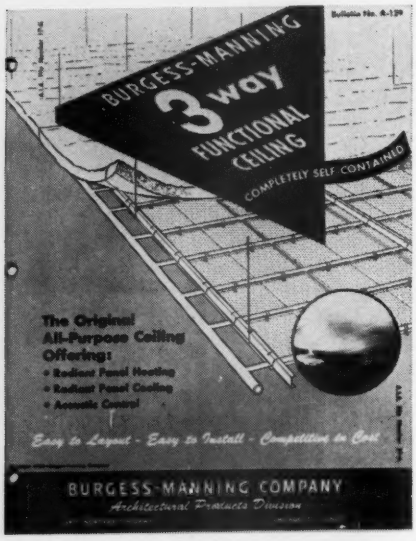
Engineer Winne Says Our Atomic Future Should Be Hailed Not Feared

. . . *Also*

- **Engineering the Plant Expansion Program —Moving Days at Fairchild—**
- **Plus News Briefs, Washington Report, Other Important Features**

. . . NEW LITERATURE . . .

To help the offering firms determine which literature you require, when requesting an item, be sure to list all specifications shown . . . and say you saw it in the AMERICAN ENGINEER.



SUSPENDED CEILING BROCHURE—The Architectural Products Division of the Burgess-Manning Company has published a brochure on Radiant Panel Heating, Radiant Panel Cooling, and Acoustic Control Ceiling.

The 3-Way Functional (suspended) Ceiling is described to be easy to lay out—easy to install and competitive in cost. Illustrations, diagrams and charts complement this presentation, which also includes a brief of twelve very important advantages of this completely self-contained ceiling—a clear-cut departmentalization of components, and their applications—performance characteristics—design procedure—layout procedure —how to estimate—the many installation short cuts which result in important savings in material, labor, weight and many others. Write: Mr. D. W. Day, Vice President, Burgess-Manning Company, Architectural Products Division, 5970 Northwest Highway, Chicago 31, Illinois.

—AE—

TWO NEW TESTING MACHINES—The new Baldwin-Emery SR-4 Universal testing machine of 50,000-lb. capacity is described in a new 8-page, illustrated Bulletin 4206 by Baldwin-Lima-Hamilton Corporation. Novel weighing system, construction, and automatic operation, as well as an unusual multiplicity of uses are presented.

Another Bulletin, numbered 4205, describes their new 50,000-lb. cement tester. Its four illustrated pages cover the evolution of the new machine with development of ASTM Test Method C 109-52, and give features and specifications of the machine. Both Bulletins available from Baldwin-Lima-Hamilton Corp., Philadelphia 42, Pa.

—AE—

BANQUET TABLE BOOKLET — The Monroe Company, Colfax, Iowa, has recently published a new 32-page 1954 catalog #250, describing the complete line of Monroe folding banquet tables in several attractive finishes, folding chairs and Monroe Trucks for folding tables and chairs. With this new catalog, the Company also introduces a new series of short radius, all-steel Transport-Storage Trucks. Write: The Monroe Company, 231 Church Street, Colfax, Iowa.

NEW PIPE DATA CARD—A new data card, designed to be of assistance to those involved in the selection, application and installation of carbon, alloy and stainless steel pipe, has been issued by the Tubular Products Division of The Babcock & Wilcox Co. Known as TDC 138 A, the data card contains information on dimensions, weights, specifications, grades and analyses of seamless and welded carbon, alloy and stainless steel pipe. It presents pertinent data on six pipe size schedules and complete reference data to steels covered by ASTM and ASME piping specifications. Write: Tubular Products Division, The Babcock & Wilcox Company, Beaver Falls, Pa.

—AE—

STAINLESS STEEL BOOKLET — A new booklet describing the uses of Allegheny Metal Stainless Steel in the paper industry has been published by Allegheny Ludlum Steel Corporation. It includes descriptions indicating where stainless is used in the pulp and paper industries plus detailed information on the technology of Allegheny Metal. Write: Advertising Dept., Allegheny Ludlum Steel Corporation, 2020 Oliver Building, Pittsburgh 22, Pa.

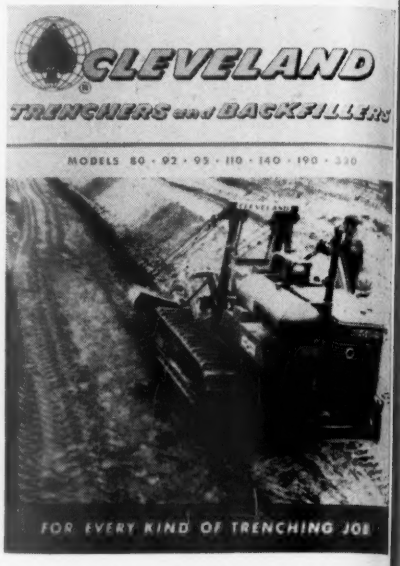
—AE—

LIGHTSTEEL CATALOG — Penn Metal Co., Inc., has just published a 12-page catalog describing a new line of termite-proof, non-combustible LIGHTSTEEL studs, joists and accessories. The new line embodies many improvements in design. Several new sizes have been added to facilitate the complete framing of residences, schools, hospitals, light commercial and industrial structures, exterior curtain wall framing in multiple story buildings and other structures in the field of light occupancy construction. The new catalog gives complete specifications, engineering data, and safe loads for all stud and joist sections. Write: Penn Metal Co., Inc., 205 East 42nd Street, New York 17, N. Y.

"ALUMINUM ON THE SKYLINE"

. . . a 28 minute, 16 mm. documentary sound film shows, in color, the design and construction of Alcoa's aluminum-sheathed headquarters office building. The motion picture points up salient construction features, dating from early excavation work to completion of the building's special lightweight steel frame, 410 feet above street level.

It describes the design and fabrication of the building's 6′ x 12′ aluminum curtain wall panels, its vertically pivoted reversible aluminum windows, the building's unique radiant-heating aluminum ceiling, its aluminum plumbing, aluminum wiring and the many thousands of pounds of aluminum hardware and ornamental trim used from basement to penthouse. In the final ten minutes of the 28 minute film, the viewer is taken on a tour of the completed building. Write: Alcoa's Motion Picture Department, 722 Alcoa Building, Pittsburgh 19, Pa.



CLEVELAND TRENCHER BULLETIN—A new bulletin describing the complete line of Cleveland trenching equipment has just been published by The Cleveland Trencher Company. It has been arranged to permit a simple, quick comparison of the digging capacity and specifications of the Cleveland Trencher Models 92, 95, 110 and 140, for city and suburban utilities and pipeline trenching from 10″ to 30″ wide and up to 5½ ft. deep. Text briefly describes typical job applications, and special Cleveland construction features of each model. Write: The Cleveland Trencher Company, 20100 St. Clair Avenue, Cleveland 17, Ohio.

—AE—

LUMBER INDUSTRY BOOKLET—The conveying and power transmission equipment Chain Belt Company, Milwaukee, makes for the Forest Products Industry is described in a new 44 page book, Bulletin 53-54, illustrated with photographs, drawings, diagrams and flow charts. It is concerned with operations in saw mills, planing mills, chipping plants, and other aspects of materials handling in the lumber industry. Write: Chain Belt Company, Dept. P.R., Milwaukee 1, Wisconsin.

—AE—

MECHANICAL CONTROLS BULLETIN—A unique mechanical system incorporating a rack-like flexible cable within a smooth rigid conduit is described in the new Bulletin 500, a 16-page illustrated book now available from Teleflex Inc. The principle of the Teleflex system, to transfer accurately linear or rotary motion over a devious path without intermediate links or pulleys, is completely described and illustrated.

Of special interest to design engineers is a four-page section on actual Teleflex applications. Schematic drawings are used and the text points out the specific requirements of each application. Procedure for laying out a Teleflex Control or Linkage is also suggested, and a new "Engineering Worksheet" provides a means of outlining design requirements of the product engineer. Write: Teleflex Inc., Department Y, 125 South Main Street, North Wales, Pa.

Letters

Kudos for Lunch . . .

Dear Editor:

. . . We would like to have you know that we now enjoy and profit from . . . Milton F. Lunch's *From Washington* as it appears each month in the AMERICAN ENGINEER. (Mr.) Lunch really knows what's going on and how to tell it. . . .

K. AUSTIN JEWELL, P.E.,
Evanston, Ill.

Reporting By Branch . . .

Dear Editor:

. . . I would like to see in the AMERICAN ENGINEER a breakdown of important events in all of the engineering branches. It seems that this might stimulate interest in the Society by some of the younger and specialty engineering branches.

W. B. FOX, P.E.,
Bartlesville, Okla.

▶ The *American Engineer*, of course, does not report technical news of any sort inasmuch as it is designed to be a professional journal bringing general news of the profession to its readers. The magazine deals with subjects of interest to *all* engineers: legislation, public relations, education, recognition, public service, and the like. To break down the magazine by branches of the profession, as suggested by Reader Fox, would tend to divide rather than unify our readership.—*Editor*.

Strikes and Engineers . . .

Dear Editor:

I read the article in a recent issue of your magazine, written by Benjamin F. Fairless on the labor question and thought it excellent. I have now read the one in the January issue, entitled "An Engineering Solution to the Strike Problem," by Pilson W. Kelly. It is superb. His paper is above criticism and I am not, in this letter, trying to analyze his reasoning.

I believe there are some small companies that might be pointed to as proving grounds, but while they may have accomplished some results of value, they have not the financial backing to act in the way Mr. Kelly suggests. They can do little more than apply "hit-and-miss" methods without working from the fundamental elements and standardized measurements such as employed by engineers (I assume Mr. Kelly includes physicists, chemists, etc. in the term "engineers").

Mr. Kelly points out the need for "business" to develop financial proving grounds and expresses conviction that it can be done. How to do this is the duty of the financiers and business managers to determine.

I am not presuming to "carry the ball" further, but I suppose the proving ground would be a small company operated as a pilot plant by a group of large companies, which would employ experts in all the fields bearing on the subject, just as large engineering projects bring in all the specialists that can contribute knowledge to the problem in hand.

HENRY T. COATES, P.E.,
Clinton, N. J.

Dear Editor:

"An Engineering Solution to the Strike Problem," by Mr. Pilson W. Kelly in your January issue was a brave attempt to solve a pressing problem. However, in my opinion, the analysis of the problem was not correct. Therefore, the solution was not valid. Let us analyze the problem using the syllogism so favored by Mr. Kelly's friend Aristotle.

If management and labor disagree there is dissatisfaction in their relationship. But, management and labor do disagree. Therefore, there is dissatisfaction in their relationship.

If labor is the complainant, labor is dissatisfied. But, labor is the complainant. Therefore, labor is dissatisfied.

If labor is dissatisfied its wants are not being fulfilled. But, labor is dissatisfied. Therefore, its wants are not being fulfilled.

If industrial labor is being well paid some other want is not being fulfilled. But, industrial labor is being well paid. Therefore, some other want is not being fulfilled.

If the wants of industrial labor are both material and spiritual and the material want is being fulfilled then those unfilled wants must be spiritual. But, such is the case. Therefore, the unfilled wants of labor are spiritual.

Industrial workers want to be appreciated, to be important, to belong, to be vital to the organization of which they are a part, to get the opportunity to make full use of their talents. A creature has an inherent desire to have his labor contribute to the greater glory of his Creator. A citizen wants his work to contribute to the welfare of his neighbor. A member of society wants his time utilized to make the world a better place in which to live. The spirit craves to leave its mark on the face of time. Money cannot buy the right to consider it a cog in a machine, a number on a time card, or a digit in a financial statement.

Man is one created in the image and likeness of his God. He is endowed with an intellect and a free will. The industrial worker is the man with the hoe who through free enterprise has become the captain of his fate. He enjoys the material benefits it has provided and he would naturally like more of them. However, the satisfaction of his spiritual wants has not kept pace with the satisfaction of his material wants. More pay has satisfied his material wants and he is under the mistaken impression that it will also satisfy his spiritual wants. He believes that the more pay he receives the more im-

(*Continued on page* 5)

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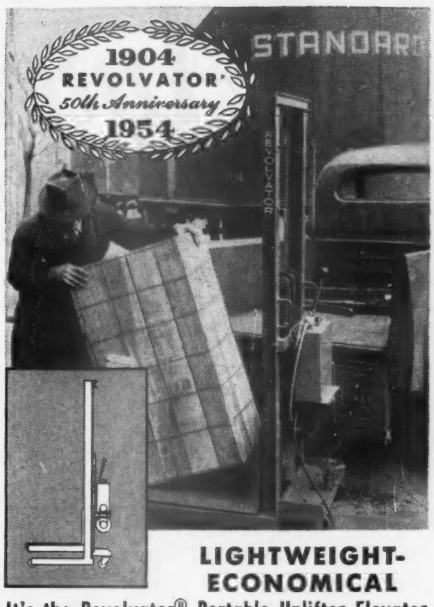

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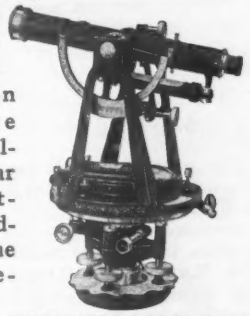

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MARCH 1954

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About the Cover . . .

The panel of small pictures shows, *top:* Baker Day at Bikini Atoll, June, 1946. *Center:* The atomic-powered submarine, USS Nautilus, is launched in January, 1954. *Bottom:* The Atomic Energy Commission's new (1954) atomic submarine reactor operated by General Electric.

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NATIONAL SOCIETY OF PROFESSIONAL ENGINEERS FOUNDED 1934

• SPECIAL ARTICLES

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Letters

(Continued from page 3)

portant he will be and the more management will appreciate him.

Management must learn to distinguish the worker from his work. Competent supervision must bring out the tremendous spiritual values inherent in work and in free enterprise itself. Enterprisers and workers can team up to present the world with a civilization of which even our friend Aristotle would be proud.

PETER A. SEWARD, P.E.,
Swampscott, Mass.

Credit . . .

Dear Editor:

Your January 1954 issue of the AMERICAN ENGINEER, page 3, carries a letter from D. B. Steinman, P.E., New York, N. Y., in which he uses these words: "It would be of interest to your readers to know that this bridge is the job of D. B. Steinman, first President of the N.S.P.E."

Following that is his second sentence reading: "Since it is one of the objectives of N.S.P.E. to see that engineers are given credit for their work, it would be appropriate for you to print a suitable credit note in the next issue of the AMERICAN ENGINEER."

Before me is the Constitution and Bylaws of the N.S.P.E. issue of January 1, 1949. Article II on Objectives reads:

"The Objectives of the National Society shall be the advancement of the public welfare and the promotion of the professional, social and economic interests of the professional engineer."

That is all there is on the matter of Objectives.

The only sentence I can find that would come close to Dr. Steinman's words ("to see that Engineers are given credit for their work") is under "Relations with Engineers," "Canons of Ethics for Engineers." Section 20 reads:

"He (the Engineer) will take care that credit for engineering work is given to those to whom credit is properly due."

However turn back to Section 2 under the Canons of Ethics for Engineers under the heading "Professional Life" and we read:

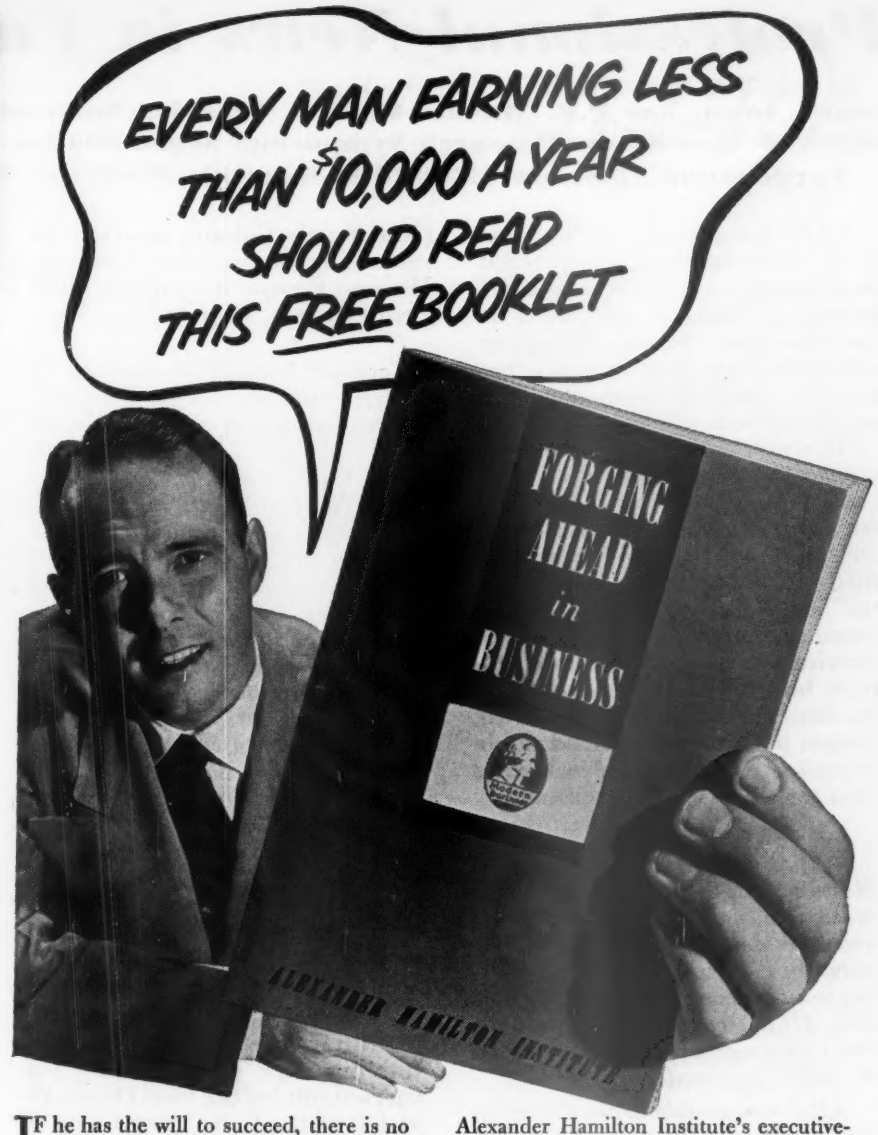
"He (the Engineer) will not advertise his work or merit in a self-laudatory manner, and he will avoid all conduct of practice likely to discredit or do injury to the dignity and honor of his profession."

I ask the questions:

1:—Has anyone taken credit away from anyone?

2:—What constitutes "a self-laudatory manner?"

H. H. WHITE, P. E.
Atlanta, Ga.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Professional News in Capsule Form

Ames, Iowa, has P.E. Mayor • G. J. Crowdes Nominated for Electrical Engineers Office • Operations Research Symposium Scheduled for Kansas City, Mo. • Dravo Corporation Sponsors $12,000 Scholarship Program • Other Items of Interest

Ames, Iowa, is one of the latest U. S. cities to elect a registered professional engineer as mayor. Joseph P. Lawlor, president of the General Filter Company which he organized in 1935, began his two-year term of office on January 4.

The new mayor, who is registered in several states, has a long record of engineering and administrative experience, and he has specialized in the development of large capacity underground water supplies and water conditioning. He has taught civil engineering courses at Iowa State College, has served as a commander in the U. S. Naval Engineering Corps, and has had considerable experience in civic affairs, having also served as city councilman.

* * *

G. J. Crowdes, a member of the Massachusetts SPE, has been nominated as a candidate for the office of vice president of the American Institute of Electrical Engineers, according to an announcement by H. H. Henline, AIEE secretary. Mr. Crowdes is chief engineer of the Simplex Wire & Cable Co., Cambridge, Mass.

AIEE vice presidents are elected for two-year terms. The results of the balloting will be announced at the Summer and Pacific General Meeting in Los Angeles in June.

A. C. Monteith, vice president in charge of engineering, Westinghouse Electric Corporation, Pittsburgh, has been nominated for the 1954-55 term as AIEE president, according to Mr. Henline's report.

* * *

Sponsored by the Midwest Research Institute, a symposium on "Operations Research in Business and Industry" will be held in Kansas City, Mo., April 8-9. It is expected that the symposium will attract well over 400 top industrial and business leaders. Keynote speaker for the sessions will be Dr. C. West Churchman, director, Operations Group, Engineering Administration Department, Case Institute of Technology.

Attendance will be open to all interested persons, and further information can be obtained from Martin Goland, associate director for Engineering Sciences, Midwest Research Institute, 4049 Pennsylvania, Kansas City, Mo.

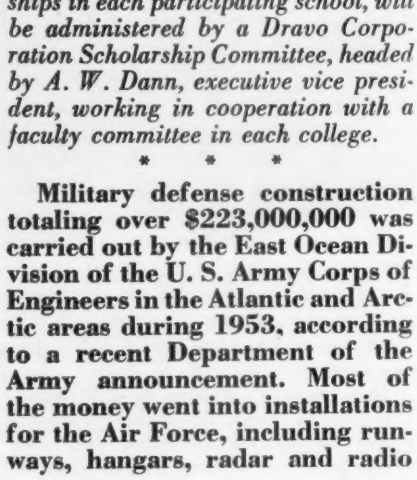
* * *

Carnegie Institute of Technology, Lehigh University, and the University of Pittsburgh will share in the recently-announced annual $12,000 Dravo Corporation Scholarship Program. The first grants will be made this spring to a sophomore in each college who will be a junior in the fall term. The awards at Carnegie Tech and Lehigh will be in engineering, while that at Pitt will be to a student in business administration. The program will be extended to include engineering scholarships in an out-of-state institution as soon as final details are worked out.

The award program, which after the first year will provide two scholarships in each participating school, will be administered by a Dravo Corporation Scholarship Committee, headed by A. W. Dann, executive vice president, working in cooperation with a faculty committee in each college.

* * *

Military defense construction totaling over $223,000,000 was carried out by the East Ocean Division of the U. S. Army Corps of Engineers in the Atlantic and Arctic areas during 1953, according to a recent Department of the Army announcement. Most of the money went into installations for the Air Force, including runways, hangars, radar and radio stations, warehouses and troop facilities, according to Major General Samuel D. Sturgis, Jr., Army Chief of Engineers.



This is the time of the year you really appreciate us, huh, Dad?

Brigadier General Robert G. Lovett, Richmond, Va., division engineer in direct charge of the work, reported that nearly 20,000 civilian workers were employed on the jobs, including approximately 6,000 Americans and more than 13,000 foreign nationals.

* * *

Major General Leif J. Sverdrup, a member of the St. Louis Chapter, Missouri SPE, has been awarded Norway's Royal Order of St. Olav, grade of Commander with Star. The honor is the highest award Norway confers on a non-citizen. It was bestowed at the direction of King Haakon in recognition of the distinguished World War II service of General Sverdrup who is a native of Norway.

* * *

It has recently been announced that there are an increased number of fellowships available in Traffic Engineering at Yale University for the 1954-55 term. The fellowships are awarded on a competitive basis to applicants who are residents of the continental United States and are graduates of an accredited school in engineering. Closing date for applications is April 1, 1954. Further information may be obtained from Director, Bureau of Highway Traffic, Yale University, Strathcona Hall, New Haven 11, Conn.

* * *

The Seventh Annual Municipal and Public Health Engineering Conference, sponsored by the Florida State Board of Health and the Civil Engineering Department of the University of Florida, will be held at the University in Gainesville on March 9-10. The theme of the conference will be "Community Planning and Development," with special emphasis on real subdivision regulations.

* * *

Conferences of interest to engineers scheduled for next month include:

Conference on Instrumentation in Water, Sewage and Indu

trial Waste Treatment, April 22, Manhattan College, New York City, sponsored by the school's Civil Engineering Department.

Second Annual Conference on Feedback Control Systems, April 21-23, Hotel Claridge, Atlantic City, N. J., sponsored by the American Institute of Electrical Engineers.

* * *

Louis N. Hunter, vice president in charge of research and member of the board of directors of the National Radiator Company, Johnstown, Pa., is the new president of the American Society of Heating and Ventilating Engineers.

Rated as one of the country's top research engineers, he is also known as the author of numerous technical papers and articles.

* * *

J. L. Atwood, president of North American Aviation, Inc., Los Angeles, has been elected president of the Institute of Aeronautical Sciences for 1954.

A native of Walton, Kentucky, Mr. Atwood has been with North American since 1934 when he took the position of chief engineer. He holds an A.B. degree from Hardin-Simmons College in Abilene and a B.S. degree in civil engineering from the University of Texas.

* * *

Dr. Thorndike Saville, dean of the College of Engineering, New York University, has taken office as president of the Engineers Joint Council for 1954. In assuming his new position, Dean Saville, who is also a member of NSPE, pointed out that "Engineers must assume greater responsibilities in maintaining and enlarging economic stability, military security, and the general welfare in the coming year. The nation's domestic and foreign affairs today rest to a considerable degree upon successful engineering accomplishments."

* * *

The Newcomen Medal, bestowed only three times previously in the history of the United States branch of The Newcomen Society, was awarded recently to William H. Rowand, vice president of The Babcock & Wilcox Company of New York.

The medal is awarded for achievements in steam, and foremost among Mr. Rowand's contributions, which led to his nomination for the honor, was his invention in 1936 of the cyclone steam separator.

* * *

Victor E. Vallet, a member of the Detroit Chapter, Michigan SPE, and president of the engineer-architect firm, Giffels & Vallet, Inc., L. Rossetti, has predicted almost record industrial and public works construction during 1954. Mr. Vallet said that 1953 was a record year for his firm in assignments in behalf of industrial corporations and that indications are that the first half of 1954 will equal the '53 rate, while the last half promises to come very close to meeting the 1953 load.

* * *

Lehigh University, Louisiana State University, Northwestern University, and the South Dakota School of Mines and Technology have received grants for various engineering studies from the National Science Foundation.

NSF grants for studies in the field of scientific manpower have also been made to the American Institute of Physics, New York, N. Y.; the American Meteorological Society, Boston, Mass.; and the National Bureau of Economic Research, Inc., New York.

Johnston Recommends Nuclear Engineering Registration

At the recent annual meeting of the Idaho SPE, L. E. Johnston, a member of the Society and manager of the Atomic Energy Commission's Idaho Operations Office, offered the recommendation that the State Board of Engineering Examiners seriously consider adding nuclear engineering to those branches in which registration is granted.

Such action in Idaho and other states, Mr. Johnston said, would bring necessary recognition to the newest branch of engineering, stimulate greater interest in the field, and enable boards of registration, professional societies, and universities to work in unison to develop acceptable curricula for the training of the nuclear engineers of the future.

Engineer's Role In Industry Is Topic

G. A. Reinhard, Jr., chief engineer, Armstrong Cork Company, was guest speaker at an early February meeting of the Lincoln Chapter, Pennsylvania SPE. The meeting was held in York, Pa., and Mr. Reinhard's subject was *The Engineer's Place in Industry.*

E. L. Dryer, chapter president, presided at a brief business session preceding the lecture.

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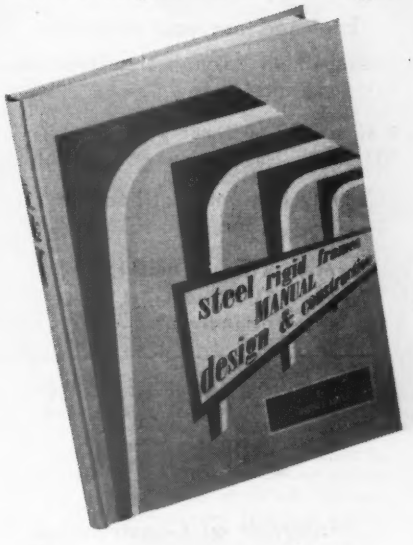

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Shown are W. E. Evans, Jr., left, and J. T. French, petitioners for decertification of the E.A.A., Georgia Division of Lockheed Aircraft Corporation.

Lockheed Engineers, DuPont Technicians, Vote Against Union Representation

The engineers and chemists employed by Lockheed Aircraft Corporation, Georgia Division, at Marietta, have followed up their victory in winning the right to a decertification election on the question of union representation (January, 1954, AMERICAN ENGINEER) by voting to oust the union.

The election, held under the auspices of the National Labor Relations Board, was on the question of continued representation by the Engineers and Architects Association, affiliated with Engineers and Scientists of America, national federation of collective bargaining engineering groups. The union had represented 662 employees at the time of the election and was ousted from further representation by a vote of 363 to 241.

In another union representation development, competing claims of two unions to bargain for the technical employees (party chiefs, instrumentmen, levelmen, rodmen, estimators, draftsmen, etc.) of DuPont's Construction Division at the Savannah River H-Bomb plant in South Carolina were rejected by the workers. The rival unions were American Federation of Technical Engineers and International Union of Operating Engineers, both affiliated with the AFL. The NLRB reported that 59% of the voters were opposed to representation by either group. Last May, the plant's operations employees voted "no union."

Mt. Vernon Movie Cited On Dorese Bell Broadcast

Miss Dorese Bell, women's news commentator over the more than 30 stations of the American Broadcasting System, gave her audience a capsule review of the NSPE Engineers' Week film, "Pilgrimage to Mount Vernon," recently. Miss Bell gave a feminine slant to the story of the visit to Washington's home, made by NSPE President T. Carr Forrest, Jr., and U. S. Senator George W. Malone, by describing for the ladies the colonial kitchen implements that the visitors inspected and contrasting them with modern kitchen equipment that makes cooking so much easier—thanks largely to modern engineering.

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A DOCTRINE FOR ENGINEERS: THINK BIG, PLAN BIG!

By HARRY A. WINNE, P.E.,
Former Vice President-Engineering, General Electric Company

This Is a Growing Country That *Thinks* Big, the Author Says, and to Reach Future Goals, We Must *Do* Big. Here's Why Engineers Must Take the Lead In Planning America's Future.

ALLAN NEVINS, the eminent Columbia University historian, was quoted recently as saying that almost everything is possible in the United States because of our buoyant social structure and a special faith.

He went on to say that our buoyancy and faith are supported by, first, the immense vigor of science and scientific thought in our constantly expanding technology, and, secondly, the skill and vigor of our organizing genius in the fields of industry and business.

These two factors have given us continuing scientific and technological improvements that have really resulted in an industrial revolution. Mr. Nevins pointed out that President Eisenhower has chosen men of high organizing skill and ability for his administration leaders. These men can, and are calling on the best scientific and engineering experts in the nation to help them accomplish their various tasks.

Certainly these top leaders in industry, farming, education, law, diplomacy, labor, and science will be extremely useful to us as a nation in helping to attain the goals we have set up as necessary to our growing economy.

For example, we expect a population in the United States of 174 million in 1961.

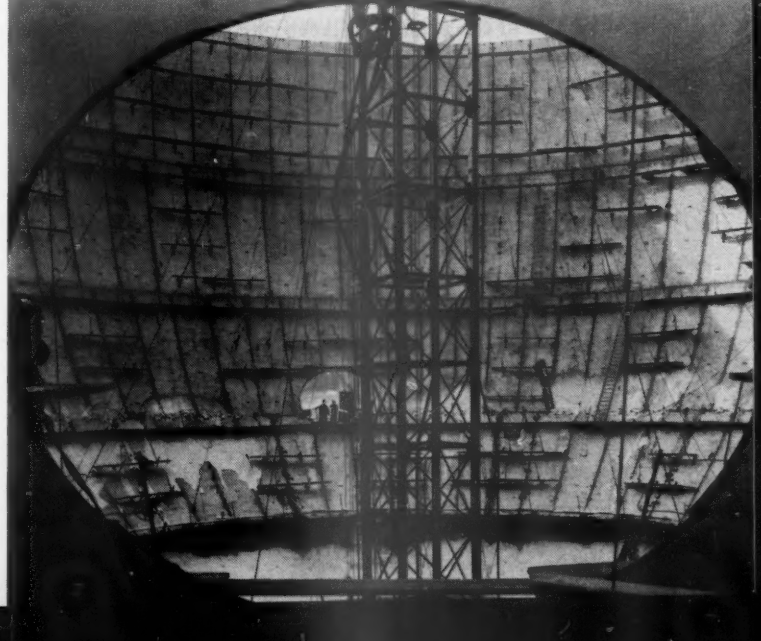
We expect the value of our gross national product—the sum total of our goods and services—to rise from 341 billion dollars in 1951 to 410 billion in 1961, a 20 per cent increase.

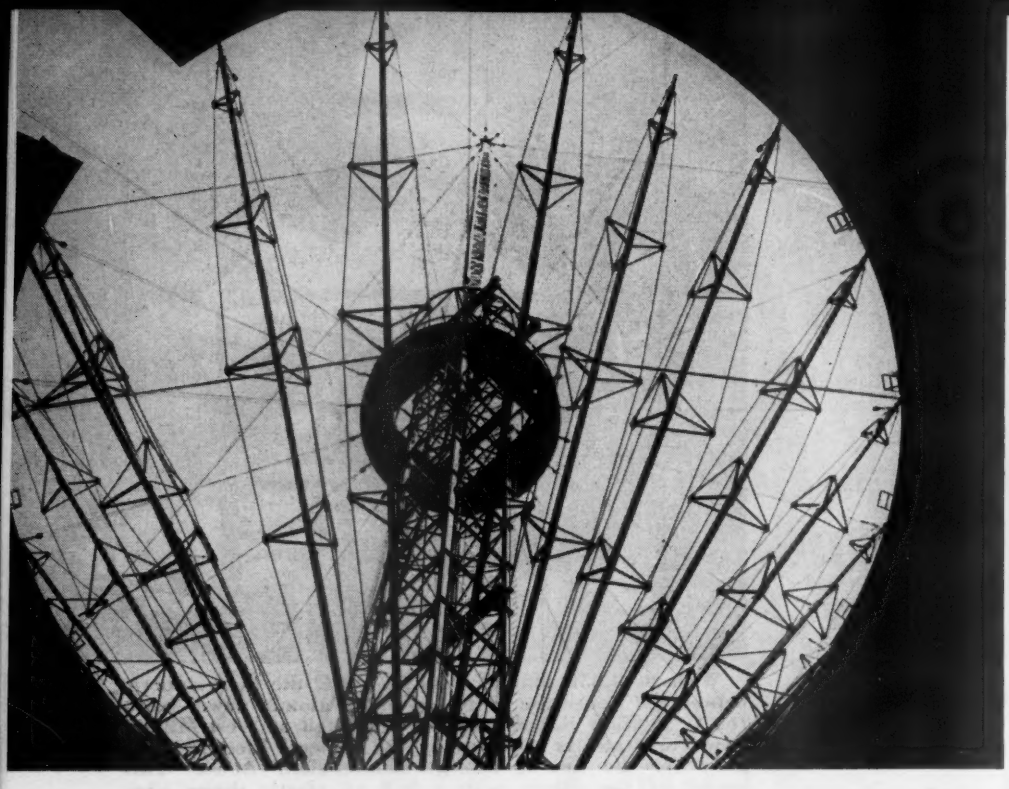
In my own field, the electrical industry, we expect installed capacity of electric utilities to rise from 76 million kilowatts in 1951 to 159 million kilowatts in 1961, or to more than double.

Looking at it another way, power sales were 318 billion kilowatt hours in 1951, a figure which is a tribute to the faith and judgment of the electric utilities in planning to meet the demands of such a load. We are fairly certain that this figure will rise to 540 billion kilowatt hours by 1960, and by 1970—or before—hold your hats here—we think it will rise to a trillion kilowatt hours.

With its 3,850 tons of steel in place, the huge sphere, below, will house the prototype of an atomic power plant for U. S. Navy Submarines. It is located at West Milton, New York, and is operated by the General Electric Company for the Atomic Energy Commission. Above: This model of the sphere with a ball of plastic shows what will be inside.

Below: The big ball under construction. It is as high as an 18-story building.





Above, left: Rising like some multi-armed monster is the steel tower and the booms used for erecting the 225-foot steel sphere at West Milton. Above, right: Scientists in the General Electric Research Laboratory make adjustments to the 300,000,000-volt, non-ferromagnetic synchrotron, a new type of atom smasher. From left to right, around the machine, are Drs. James L. Lawson, H. R. Kratz, W. B. Jones, H. G. Voorhies, and G. L. Ragan.

We are outdoing the Government in the use of big figures!

When General Electric made that prediction in mid-1950, there were some who thought we were a trifle optimistic, even a bit "loony." But now Elmer Lindseth, President of the Cleveland Electric Illuminating Company, suggests that by 1981, the output will probably hit *two* trillion kilowatt hours. Well, my point is clear, I'm sure. This is a growing country that *thinks* big. To reach these future goals, we must *do* big.

These goals will demand the best of our scientific and engineering skill plus organizing skill in business and industry. Yet, as Mr. Nevins points out in his analysis, in reaching these goals with their demands of efficiency and organization, we must not sacrifice our democracy or freedoms.

This then is one of our main problems. How can we attain these material goals of more production and more power and at the same time keep our cherished freedoms, our democracy, and our status as individuals free to live our own lives? Parenthetically, and emphatically, I believe we *cannot* attain them *unless* we do keep our freedoms and a real democracy!

WE are going to need all the buoyancy and faith with which we are credited. Let me suggest to engineers and industry four prerequisites to meeting the problem of our continuing growth.

These are:

1. Constant research and inventiveness
2. Accelerated communication of ideas
3. Continued courageous investment
4. Winning and maintaining public confidence and understanding.

Let us consider these one by one.

First, constant research and inventiveness. As we all know, progress doesn't just happen. It has to be forced. We never know what's ahead, even for ten years. A decade ago we were predicting changes to be wrought by electronics, plastics and air conditioning. These predictions have come true, but we didn't even mention two of the most amazing developments of the last decade: atomic energy and the jet engine.

Actually, these two developments are just started on their road to helping mankind, yet they bid fair to grow into industries of great size. Eleven years ago the first successful atomic pile had just begun to operate under the Chicago University Stadium.

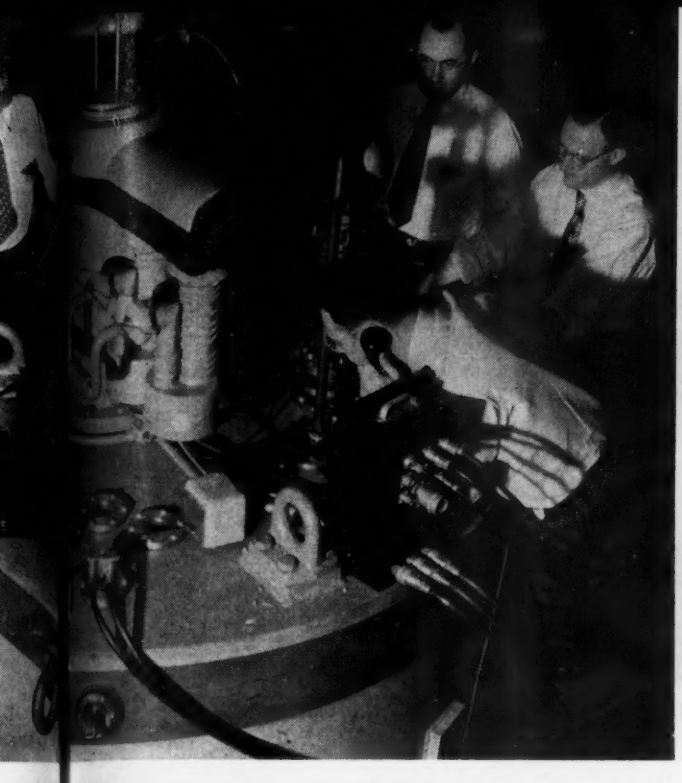
Today, several billion dollars later, atomic energy is one of the biggest industries in the country. Atomic and hydrogen bombs, nuclear-powered submarines, nuclear-powered airplanes, nuclear-powered ships . . . all are military phases of this development with which we are more or less familiar.

But what of the commercial implications that have been promised? How do they look? Well, in my opinion I think we are just on the threshold of peacetime uses of atomic energy, with a long and difficult corridor stretching out ahead of us.

The atom certainly offers possibilities as a source of power in the future, but let me make it abundantly clear that I do not think the time will *ever* come when atomic energy will materially supplant oil or gas or coal as a fuel. Rather, I think atomic energy will only supplement the more conventional fuels.

It will be used in situations where its peculiar qualities solve specific problems such as in ships, for example. It will, I believe, have use in atomic-electric power plants in the long-term future. When I speak of an atomic-electric power plant, I mean a plant in which an atomic pile generates heat due to the splitting of atoms of uranium or plutonium. This heat then can produce steam to supply a conventional steam turbine-driven electric generator.

Of course, it would be very nice if we could convert directly to electric power the energy released from the splitting atoms, but there seems to be no known or probable way of doing this on a reasonable scale. So we have to



think of the atomic pile as essentially a steam boiler, with practically no change in that part of the power station which is beyond the turbine throttle valve.

But, you may ask, do we know how to build such a power plant? From the technical standpoint, with perhaps just a little poetic—or engineering—license, my answer is yes. Of course, there are many problems to be solved. However, we know in general the kinds of materials to use. We know pile designs that will work. We know how to control the power output. We know how to shield the pile to prevent radiation danger to personnel.

But we do not know how to build and operate it at a reasonably competitive cost. To solve that problem, I think, is going to take a long time, but I believe it will be done eventually.

You have undoubtedly read of studies which are being carried on by a number of industrial groups, each comprising a power company and a chemical company or some other industry. These studies have been pointed toward determining the practicability of building an atomic plant which would produce plutonium for the Government for use in weapons, and electric power more or less as a by-product. These studies will unquestionably produce some very useful information, and are very helpful indications of the growing interest of industry in atomic-electric power. However, as I see it, atomic-electric power will be really economically sound only when it can compete with conventional electric power without requiring the subsidy of a government-supported weapons market. It could not do that today—unless in some very peculiar and unusual circumstances—nor, in my opinion, for a good many years to come. While there have been some estimates of five to seven years for such developments, I believe it will be at least fifteen or more.

ACCURATE cost comparisons are impossible because of the secrecy which surrounds data on atomic piles. A few years ago an Atomic Energy Commission paper stated that the average cost of the then planned experimental piles was on the order of $10,000 per equivalent electrical kilowatt output. Presumably the experience gained since then would reduce that considerably, particularly for a large central station.

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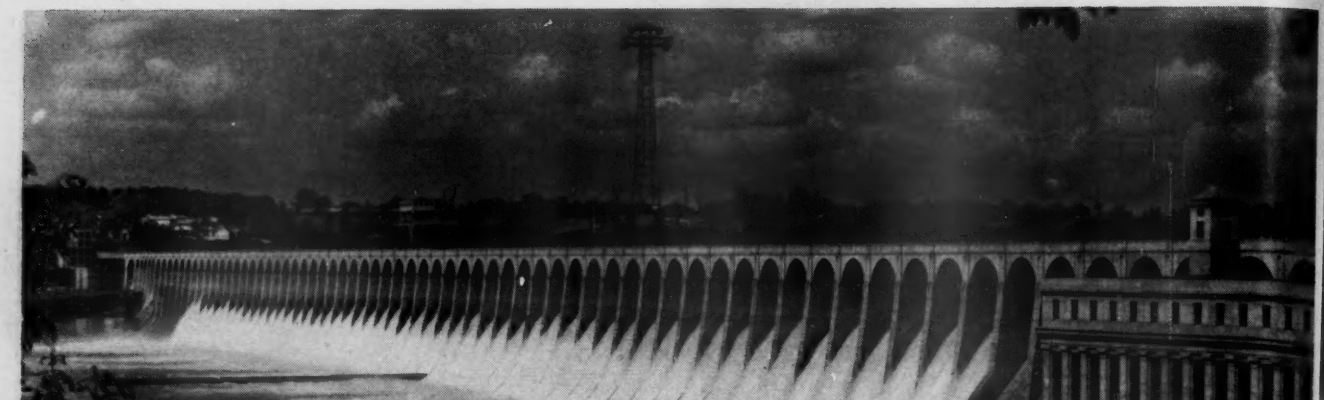


The author expects the installed capacity of electric utilities to rise to 159 million kilowatts by 1961.

Contrast this figure with conventional power plant costs for a 625,000 kw coal-fired station as reported by Walker L. Cisler, President of the Detroit Edison Company. The electrical part of the station, including the turbine generators, which could be the same in an atomic-electric plant, cost $81 per kw capacity, but the cost of the steam generating part of the station, which would be replaced by the atomic pile and heat exchanger, is only $77 per kw.

That gives you an idea of the target. I think we do not yet have the gun nor the ammunition to come anywhere near hitting it. But just give us time—and quite a lot of it.

Now let us consider some possible applications of atomic-electric plants other than in central stations. An important determining factor is the great concentration of energy in nuclear fuel. It is probable that the first practical application of atomic-electric power in this country will be to a submarine power plant. Both the General Electric Company and the Westinghouse Electric Corporation are designing and building such plants for the Navy, and the first submarine which is to have a nuclear power plant has recently been launched.

The concentration of energy in atomic fuel is so great that it seems probable that the initial fuel charge would permit the submarine to operate for a number of months without requiring additional fuel. Furthermore, atomic fuel does not require combustion with air to liberate its energy. Therefore, a submarine would be capable of operating submerged at full power for a very long period of time. This would be a tremendous tactical advantage. There are also possibilities of using atomic power plants in the merchant marine fleets in the future.

The Air Force is very actively interested in the application of atomic power to aircraft. General Electric, Pratt and Whitney, and others are working on this application. While the light weight of the fuel and the long range which it would permit are great advantages, the necessity for heavy shielding is a distinct disadvantage. This application involves very difficult scientific and technical problems.

This heavy shielding required and the complicated heat transfer system preclude any possibility of application to automobiles or similar vehicles. It may be possible some day to build an atomic power plant for locomotive application, but I question whether it will be economical.

Because nuclear fuel is such an extremely concentrated source of energy, it may, before it comes into more general use, bring economical electrical power to areas where the transportation costs on ordinary fuel are extremely high. However, I do not visualize small atomic power plants springing up in every isolated area. To be efficient and economical, I think an atomic power plant will necessarily be of large capacity for military or other very special situations.

The second new development I mentioned is the jet engine. Of course the fundamental theory of the gas turbine was well-known before the turn of the century. But to make it practical, metallurgists had to develop new high-temperature alloys. Engineers had to gain new aerodynamic knowledge in order to design turbines and compressors of adequate efficiency. Manufacturers had to develop new methods of machining and fabrication.

If the production of an operating gas turbine fifty years ago had been a command performance—as was the manufacture of an atomic bomb in the early forties—the expenditure of many millions of dollars would probably have resulted in a working unit, perhaps with combustion chambers and buckets of platinum. Imagine what its cost might have been.

Of course, there is no doubt that the demands of war did accelerate the development of the gas turbine. but then I think we were ready for the benefits it brings. Eleven years ago, the first practical jet engine in America was undergoing tests in General Electric's Lynn, Massachusetts, plant.

TODAY, after what many have referred to as the fastest decade in history, the gas turbine powers our Air Force planes. There are gas turbines pumping gas through Texas pipelines, driving locomotives on the Union Pacific Railroad, and generating electric power for a number of utilities, including one at Gainesville, Texas, and one at Belle Island, Oklahoma, as well as others in Vermont, Maine and other areas.

What will tomorrow bring? Certainly the ever-widening field of petro-chemicals brings to our attention new marvels in materials.

When we learn the secrets of photosynthesis, we may be able to bring about industrial production of food rather than to be dependent upon crop growing. Solar energy may be tapped some day as a source of real power. Even the motion of the waves and tides is under study. All of these warrant investigation.

Research and inventiveness have always been dominant characteristics of engineers and scientists. Not haphazard inventiveness, but deliberate invention.

Throughout the years, many companies have followed a policy of relentless research and development. Such was the case seventy-five years ago when Thomas A. Edison and a group of men formed a company to *invent* the electric light. Several thousand experiments later they had done just that and the face of the world was changed. A whole new way of life came rushing in because of the courage and persistence of a man who didn't know the meaning of the word "fail."

There is no evidence today that such research and inventiveness is dying out. Instead, it is *intensified* and has become a habit instead of an effort of will. The future will need such thinking in even greater proportions than the past.

My second main point is the need to accelerate the communication of ideas. If it is important to develop new ideas to help mankind, then it is also important to communicate those ideas to the people who can use them on the farm, in the home, and in the factory.

I am sure all of us realize that competition is generally healthy for industry, but there are also areas of cooperation in the exchange of ideas that will advance all mankind . . . ideas that let people know the latest trends and developments to help them live more comfortably and to do business more efficiently.

As one example, the General Electric Company has the "More Power to America Program" which is designed to speed the pace of electrification of industries, municipalities, farms and the home through spreading the latest in electrical ideas. This cooperative program was begun eight years ago. We have prepared over 25 film programs on the electrification of various industries and municipal services, and more are coming.

THESE films are used not only by GE, but also by the utilities and other interested organizations, who have bought more than two thousand prints of the films for daily use by their sales forces to spread electrical ideas.

Under "More Power to America" auspices, General Electric and local utilities have been sponsoring Productivity Forums attended by the management of local industry. For a whole day, two or three hundred of these industrial executives and engineers will listen to expositions on useful new electrical developments they can put to work in their factories. Probably every reader of the AMERICAN ENGINEER can think right now of ways in which his company or industry is working to communicate the latest in engineering ideas to its customers.

Science and engineering have always thrived on a free exchange of ideas. Scientific research, and publications devoted to the free exchange of ideas, must be continued. While the details of atomic weapons must be kept secret, the public is entitled to be informed on the technical matters that affect public policy.

I cannot conceive that rigid control and secrecy will continue for many more years. Our potential enemies will, in time, probably know as much about atomic energy as we do—possibly even more. So the need for extreme secrecy may disappear. Such a plan for exchange of ideas as recently advocated by President Eisenhower, if adopted, should help.

The third main point I want to make is that there must be *continued courageous* investment in progress. Progress costs money. We must support our faith in this country with cash. The evidence points to the fact that this is being done in many quarters and by many companies.

For example, in 1953 business spent about 26.4 billions for new plants and equipment. By the end of 1954 the private utilities will have spent 18 billion dollars in private funds since World War II. By December, 1954 General Electric will have spent about a billion dollars on plants and equipment since World War II.

Now the spending of this money is not foolish optimism nor entirely patriotic; rather, it reflects a hard-headed faith in the future of this country and a belief that we are destined to *grow* and *grow* and *grow* and to need *more* and *more* goods and services.

As engineers we must *think big* and encourage our management to *plan big* enough to meet future needs. For example, when we spent 30 million dollars a few years ago for a new turbine plant in Schnectady, we thought we had enough facilities to meet future needs of the utility industry for a long time.

In fact, Charles E. Wilson, who was president of General Electric at that time, said he feared for awhile the building might be known as "Wilson's Folly." But what *did* happen? The building was too small within less than two years and a 6½ million dollar addition was necessary before the newness had even worn off the first building. This was true even though improvements in manufacturing methods had increased the output far beyond that originally planned. And the walls are beginning to bulge again.

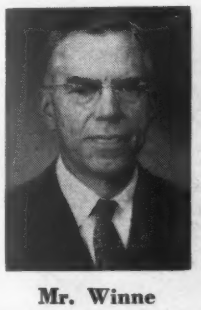
Courageous investment is necessary to get the production that this country needs to meet the demands of the future. Productivity means power and power is necessary to freedom. It is the difference between survival and disaster.

Now for my final point. We must *win* and *maintain public understanding* for our efforts. This is an age of judgment for the scientist and engineer. We are performing before a vast audience which is somewhat critical of our efforts at times. It is a frightened audience, but a fascinated one.

As the average citizen counts his scientific blessings, he carries around in the back of his head a mushroom cloud put there by the memory of Hiroshima, also the gift of science. This is no reason to abandon scientific

(*Continued on page* 41)

About the Author . . .



Mr. Winne

Harry A. Winne, who has recently retired as a vice president of the General Electric Company, is one of the country's foremost engineers, best known recently for his atomic energy work both for GE and on a national scale. An electrical engineering graduate of Syracuse University, Mr. Winne joined General Electric as a student engineer on the test course in 1910 and advanced through various technical and administrative posts to the vice presidency.

He has served on various governmental advisory boards, including the Scientific Manpower Advisory Board of the National Security Resources Board.

He is a member of the New York State SPE and NSPE and is a fellow of the AIEE and ASME. He has recently received the James H. McGraw "Manufacturers' Medal" in recognition of his "outstanding industrial statesmanship." His other honors have included degrees from Syracuse University, Rensselaer Polytechnic Institute, and Newark College of Engineering.

Above, left: Aerial view showing progress of expansion program. At left center is east factory addition, with steelwork complete, having roof and walls constructed. At right, slightly in foreground are two camelback trusses for roof of a hangar addition. Above, right: Fairchild plant operations Manager, J. Earl Steinhauer, second from left, discusses expansion project as grading operations begin for new parking lot. In the background is parking lot which will be excavated for construction of new east addition, a final assembly building.

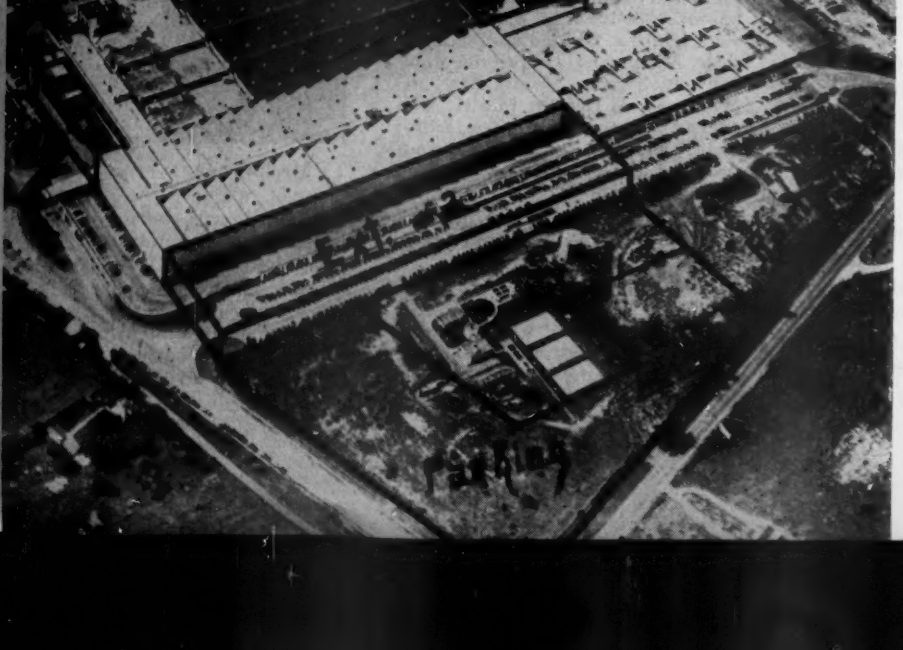
Engineering The Plant Expansion Program

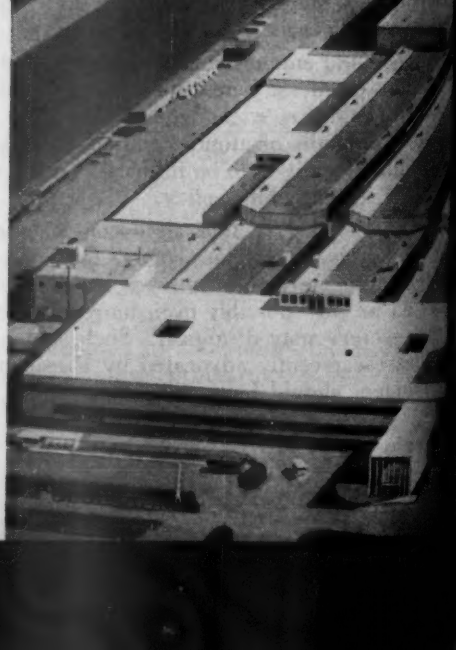
BY J. EARL STEINHAUER,

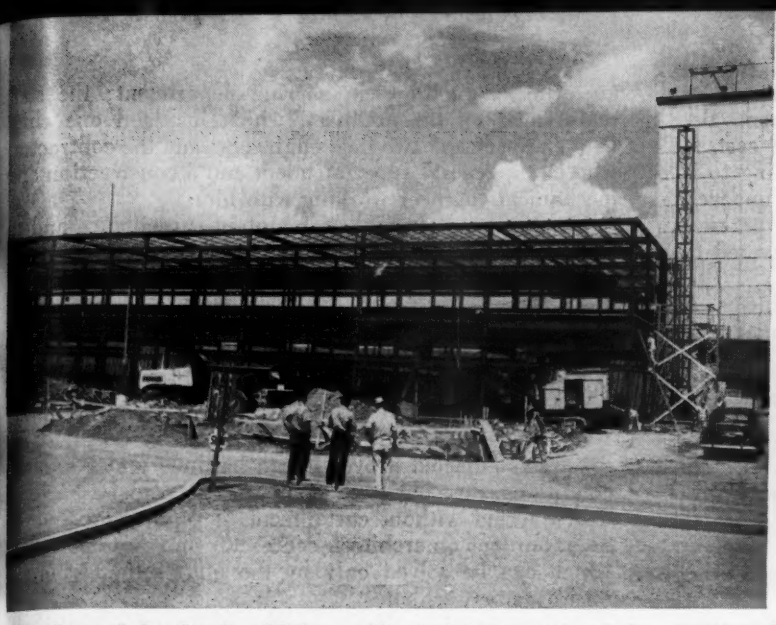
Plant Operations Manager, Fairchild Aircraft Division

All Engineers Will Be Interested in this Story of Moving Day at Fairchild. Learn How Engineers Carried on a $9,000,000 Plant Expansion Program Without Fear of the "Rule-book."

Below, left: Aerial view of Fairchild Aircraft Division facility in Hagerstown, Maryland, showing projected extensions before program got under way. Extension #2 is east extension. At right: Architect's sketch showing Fairchild Aircraft Division facility as it would look after completion of the expansion program to north, south, east and west.







Above, left: South addition, with steel framework of the two-story building about 95 per cent complete. At right: East addition looking south, showing four camelback trusses in place of the six which will support the roof. Building has a 200-foot wide clear span.

EXPANDING the physical facilities of a manufacturing plant in four directions simultaneously is never an easy job, and to conduct such a development program without interrupting the production flow is even more difficult.

The engineering problems alone would fill a book two inches thick, but Fairchild Aircraft has recently proved that they can be solved. The key to the solution is the integration of engineering know-how and the courage to put the rule-book of standard engineering practices aside now and then and depend instead on what has been called American ingenuity.

Plant expansion—especially the "growing pains" so common among defense contractors in the past decade—can be effected by pooling engineering talents coordinating thought on engineering problems, and planning every step in minute detail.

The proof that this can be done with the maximum of speed and the minimum of confusion lies in the $9,000,000 plant expansion program recently concluded by Fairchild Aircraft at Hagerstown, Maryland.

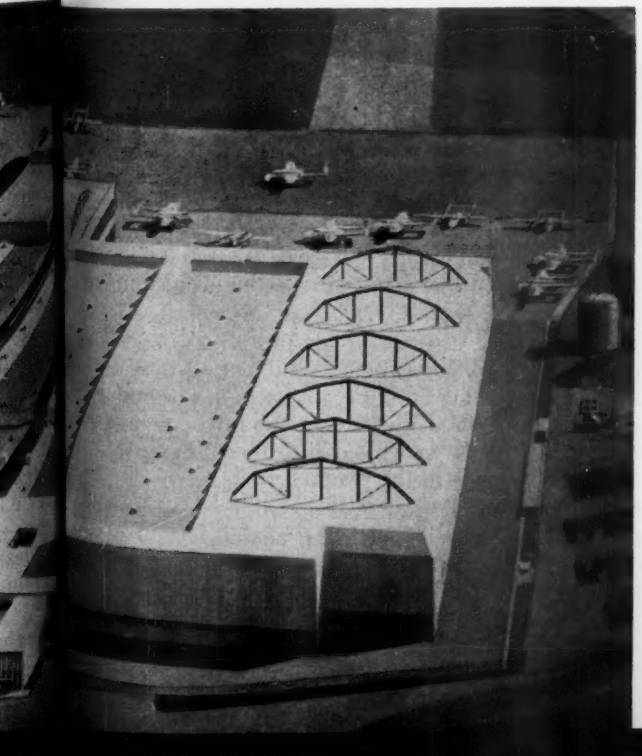
Hagerstown's aircraft industry, now a 9,000-employee operation, had started in 1925 as a one-at-a-time sport plane business. After a gradual growth for about 15 years, it was greatly enlarged early in World War II to turn out Military training planes, small utility transports, and C-82 "Flying Boxcar" troop and cargo carriers.

With the Korean War and its increased emphasis upon air logistics came an urgent necessity to expand the Fairchild facility which was then producing twin-tailed C-119 Flying Boxcars, first sons of the original C-82's. In June of 1950, these winged freight cars suddenly became a "hot item" in the military supply program, and a 50 per cent enlargement was required to provide adequate facilities for turning them out.

Surveying its needs, Fairchild decided upon a "crash" program, with the existing production facility to be expanded north, south, east, and west simultaneously. Also among the facilities to be improved were offices, processing areas, and storage and warehouse buildings. The existing plant was being utilized to the saturation point, and employment was constantly increasing as production requirements climbed.

The problems of growing rapidly were numerous enough by themselves, but there was one more problem which was to be superimposed over the whole problem.

Since the military forces demanded Fairchild transports as fast as the company could produce them, the construction projects could in no way slow down or halt the assembly lines. Production schedules had to be met, despite whatever problems they might present to the expansion planners. "Business as usual during alterations" was more than an advertising slogan—it was an order of the day.



THE major Fairchild facility, located adjacent to the Hagerstown Municipal Airport, contained 645,607 square feet of space. The program was to add 342,000 square feet to give an enclosed area of 987,607 square feet.

Limiting factors on physical growth were as follows: development to the west was limited by the airport's north-south runway; this also limited the height to any new addition under Civil Aeronautics Authority regulations. Fairchild decided to construct a one-story processing plant as the western expansion.

To the south, expansion was limited by proximity of the factory to a county road. This problem was eased by the existence of a large parking lot for company cars. It was decided to add a two-story office building here.

To the east was another company parking lot, with a considerable area of undeveloped ground adjacent. Because the existing assembly building lay to the east, it was a matter of joining the new assembly building to it in this direction. The fortunate location of the undeveloped area enabled Fairchild to construct a new parking lot adjacent to the former one, which was excavated to form the foundation of the east addition.

The north, being a ramp area, posed no problems. A hangar was to be built, adjoining an existing hangar, and more ramp or apron space concreted.

Developing the Program

AFTER making a survey, the Fairchild industrial engineering department determined how many square feet of additional space would be needed to do the job, for both direct (production) and indirect requirements.

With this information, Fairchild's plant engineering group drew up preliminary plot plans.

Next, the Aircraft Division engaged an architectural firm which was given the plot plans, drawings of the existing facility, and general specifications of what the overall operation would be.

From this information the architects prepared preliminary drawings, which were submitted to Fairchild and to Wright Field, headquarters of the Air Materiel Command, for approval. The latter was done because the Fairchild plant is a government-owned facility.

After approval, the drawings and specifications were submitted to competitive bidders and a general contractor was selected.

Construction then got under way. It was soon apparent that solving the problems involved in the major expansion of a large plant manufacturing facility on all four sides, while continuing production at a sustained peak load, would require maximum cooperation and coordination among the company's several engineering units.

These included the industrial engineering department of Fairchild; the plant operations department (plant engineering); the tool engineering department; the staff maintained by the architect, which included one chief field engineer and two field engineers; and the contractor, who had a general superintendent and a construction and mechanical engineer working with him.

Fairchild Aircraft officials are shown as they conferred with architects during opening of bids submitted by contractors on the facility expansion program.

In addition, Fairchild, to maintain surveillance and to assist in coordinating field changes, had three construction engineers and two industrial engineers on the project at all times.

In the course of preparing this article, the author was asked, "What were the most important lessons learned from this project?" However facetious it might seem, to this the most truthful answer is, "Never to do it again."

In a serious vein, it can be said that the fact that the job was completed proves it can be done under "crash" conditions . . . but such simultaneous four-way expansion, effected without curtailment of production, impose great burdens on architect, contractor and customer alike, which can be solved only by the most self-effacing cooperation between all.

A number of problems encountered, and solved, indicate some special points to be anticipated by anyone planning a similar program. Among these are:

Providing Full Information. The excavation contractor, for example, must be thoroughly informed of existing underground facilities to avoid disrupting communications, water supply, and other vital services. A disruption of communications and incoming high-tension power lines was experienced in the early stages of the program because of this factor.

Safety. Four-way expansion puts a higher premium on safety considerations. The expansion of the plant to the east, for example, involved the main entrance to production areas, through which each day approximately 4,000 workers passed on their way to and from the company parking lot . . . with cranes, bulldozers, and power shovels doing their work nearby at first and with erection proceeding later on. To solve this problem, covered walkways were built and placed across the area under construction, being moved as conditions dictated. No employee was injured during the project.

Access. With all four sides of the plant under construction, temporary access roadways had to be designated for contractors and plant truck deliveries. In most cases, these were over excavated areas through necessity, and heavy rains brought the usual problems of mud. For this, there was nothing to do but plow on through and hope for a dry spell which would bring dust as a welcome change.

Sewage Disposal. The Fairchild sewage disposal plant was located to the east of the facility. During the extensive foundation excavations for the east addition, temporary lines had to be laid and moved periodically.

Fire Hazard. Most erection was done by welding joints instead of riveting them, which materially increased the fire hazard. Fairchild fire and crash trucks, maintained for flight test operational standby, were primed and ready at all times to handle any outbreak. Fortunately, only a few fires occurred and these were extinguishd quickly.

Joining of Structures. The east wall of the existing facility had to be dismantled for the joining of the new structure to it. With maximum production proceeding in the existing assembly building, a system of tarpaulins was used to cover exposed wall areas. The tarps, 40 feet wide and 55 feet high, were raised into place along the wall by overhead cranes in the plant.

When the east addition had its roof, floor, and three walls, a masonry wall had to be demolished between it and the existing structure. This created a dust problem for workers only a few feet away from the wall. So the

new building was heated equally with the existing plant to keep dust-laden convention currents to a minimum.

The tarpaulins were moved along the wall where demolition was progressing, permitting production workers to carry on with 15 feet of demolition operations with safety. Ideas such as this of the tarpaulin were suggested by the owner, contractor, and architect alike, and tried throughout the project to bring it to a successful close.

Electrical System. The Fairchild plant was operating with an electrical system already maximum-loaded . . . and when the contractor was unable to get delivery of transformers and switch gear, the local power company placed temporary transformer banks on poles and provided temporary electrical service for equipment installed in the new office building addition . . . otherwise completion of the building would have been delayed several months. One can see from this example that it is a good idea to plan ahead with extra care for adequate utilities, and for early delivery of vital electrical equipment.

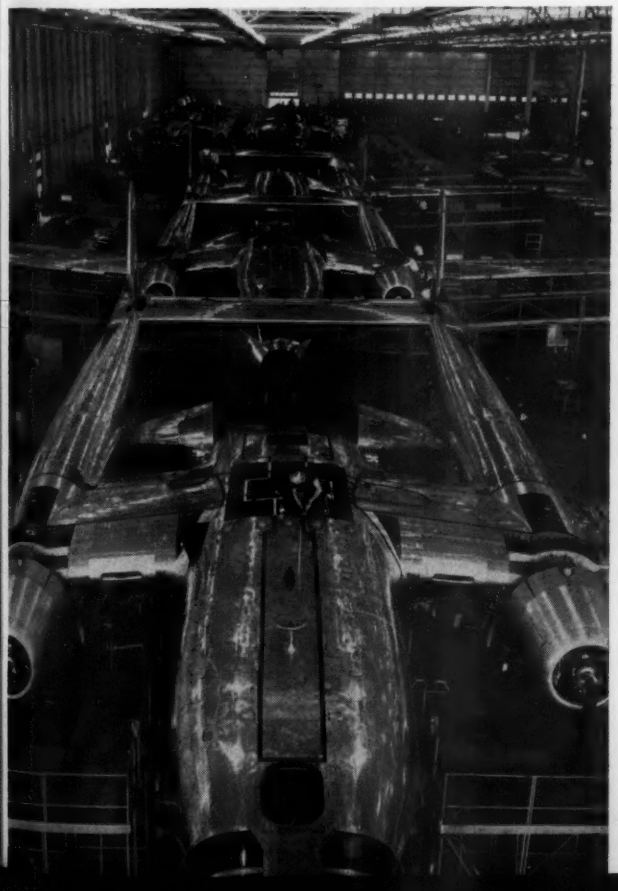
Plant Protection. It was necessary to dismantle fences on all four sides, which increased the work load on the plant protection department in maintaining effective watch on the plant, a military installation.

Security Requirements. As Fairchild is a government facility, security requirements were high, and maintaining them was complicated by the quadrangular expansion program. Contractor personnel who were not cleared for restricted operating areas were prohibited from entering the plant and using cafeteria and toilet facilities. It was necessary, therefore, to contract with a mobile feeding concern to visit the plant each day at lunch time. Also outside toilet facilities had to be installed. Needless to say maintaining plant security with hundreds of construction workmen on all sides of the plant imposed a much heavier load than usual on company guards.

To solve these and similar problems, a progress report group met each week in an informal conference at the Fairchild plant. This group consisted of company industrial engineers and plant operations engineers, architect's representatives, contractor's representatives, and the Fairchild legal counsel attached to the company's contracts administration office.

From this meeting came progress reports and progressive completion date schedules which the general contractor and his subs were required to meet.

Flying Boxcars moving down final assembly line in new production bay, a building having a 200-foot clear span. This enables overhead cranes to move assemblies anywhere in the production areas.



About the Author . . .

Mr. Steinhauer

J. Earl Steinhauer, plant operations manager for the Fairchild Aircraft Division, Fairchild Engine and Airplane Corp., is recognized as an outstanding plant maintenance authority and has authored a number of articles on this subject.

He received his early education in LeMoyne, Pa., attended Lebanon Valley College, Annville, Pa., and completed an International Correspondence Schools course in mechanical engineering.

He joined the Fairchild operation at Hagerstown, Md., in 1944, after having served as assistant manager in charge of operations at the Washington National Airport.

A flying enthusiast, Mr. Steinhauser has been actively associated with the management of the annual National Air Races since 1932, and he helped found the Washington Air Derby Association. In 1936 he was awarded a trophy as the individual who had done the most for aviation in the Washington area. He also served as consultant to the New York Port Authority on the city's airport development program.

Construction

LARGEST single unit of the program was a production bay 825 feet long and 200 feet wide. This unit was to be the east addition, joining the main production building where Fairchild had been manufacturing its C-82 and C-119 Flying Boxcars for the past seven years.

Like all the other building units, this bay was to be erected without stopping or slowing production in the building it was to be joined to.

The huge production bay incorporated a unique roof construction feature. The completed roof structure at first glance appears to be the trusswork for a camouflaged bridge. Closer examination reveals that the bridge-like steel frames are six exposed "bowstring" or "camelback" trusses which support the roof, permitting a clear span of the building's 200-foot width.

This peculiar bowstring truss construction, with welded rather than conventional riveted joints, was selected because the steel shortage when plans were drawn, plus the fact that Fairchild believed this design would provide the largest area at the lowest expenditure, viewed in terms of both initial and operating costs. By employing this design and welding the joints, the company was able to save 15 per cent on the amount of steel required, a sizable saving since 2,455 tons of structural steel were used.

An interesting erection process was used to connect the new assembly plant to the old one. The existing structure was roofed with a series of saw-toothed skylights and it was desired to replace the saw-tooth trusses in groups of three by single trusses at the point where the bowstring trusses join the existing plant.

Because the conventional method of shoring placed on the floor to remove the saw-toothed trusses and install the new ones would have taken considerable manufacturing space and seriously restricted crane travel in the old building, a different method was worked out at one of the weekly coordinating meetings.

So-called shoring trusses were installed next to the saw-tooth trusses; the saw-tooth trusses were removed and re-

(*Continued on page* 38)

For The Businessman Especially, March Is the Month When Uncle Sam Upturns His Palm. The American Engineer Asked the American Institute of Accountants to Offer Some Suggestions on How the Pain Can Be Eased. So . . .

Mr. Engineer, Meet Mr. C.P.A.

STRANGELY enough, the engineer who traditionally approaches his professional work with painstaking regard to detail will often display a surprising lack of awareness of the very matters that spell his own financial success—such as proper record-keeping. "Proper" means not merely keeping records, at which most engineers are certainly adept, but using them interpretatively to indicate answers to such important business questions as:

—How to ferret out hidden business costs.

—How to make legitimate tax savings.

—How to insure accurate, revealing business data.

—How to set realistic prices.

Big business has long recognized the extreme importance of getting precise information on these matters. Smaller enterprises can profitably borrow from the large firms who use professional accounting as an indispensable tool in daily business procedure.

Working as he does with various types and sizes of firms, the Certified Public Accountant brings to each the benefit of his experience with all. His role is not to make your decisions for you—but to act as interpreter between you and your records so that your decisions will be based on hard, cold facts.

Here are a few instances of the nature of the professional accountant's service to engineering companies.

Engineer "X" called in a CPA when his year-end profit

Scale down your costs for more profit. The first step is to get your records in shape so that you really know what your costs are. What about your overhead?

was considerably smaller than he had good reason to expect, considering his business volume.

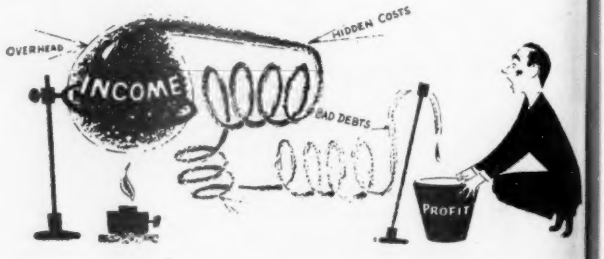
One explanation which emerged after much delving into the records was the astonishingly high cost of detailing on several jobs—this notwithstanding a good system of costing and superficially low cost records on the jobs. Typical is what happened on one industrial plant:

In laying out an elaborate intercom system, his draftsmen had leaned heavily on the wiring diagrams of the supplier about whose equipment the specification was written. The time saved looked fine on the cost sheets. But in construction it developed that the schematic diagrams had not indicated all the necessary wiring. Not only was the engineer faced with the embarrassing ta of explaining away an extra to the owner, but his offi had to reinvestigate and redetail the entire system to mak certain all the bugs were out.

As an isolated instance it was not too significant i terms of his own cost. But professional perusal of hi records pointed up that this sort of thing happened to often.

The CPA showed him the facts—the engineer saw fo himself what steps were necessary: establish better super vision in his office, and more frequent study of his cos *while* they were developing.

ON the other hand, Engineer "Y" found the opposit solution to his low-profit problem. A careful study of hi



Leaks must be found before they can be fixed. Your CPA has dozens of clients with problems similar to yours. He can tell when cost items are out of line and help you find out why. As a result you will get more out of your business for what you put into it.

costs revealed that too much time was being spent on writing specifications. For the size of his operation, he realized that it would be more economical to buy competent specification writing service from a free-lance man than to do it within his organization.

Good records are only half the story. They are valueless without proper use. They should act as day-to-day tools rather than as a post-mortem report after profits have died.

One of the CPA's prime duties is to detect fundamental weaknesses which result in capital shortage. Sometimes he finds that the record system itself is deficient. Sometimes the trouble is merely that good records are not used properly for sound business decisions.

Odd though it sounds, many a professional man overpays his taxes either through lack of knowledge of the rules, or, more commonly, because he just is not tax conscious when it comes to daily moves. Here's how tax awareness pays off in such a simple case as the engineer

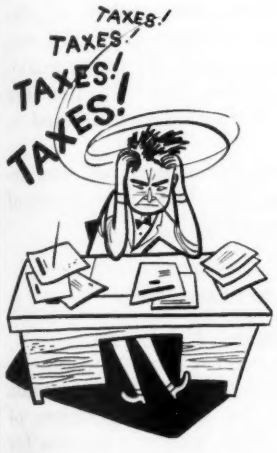
who employs his 16-year-old son as an office boy during the youngster's school vacations.

Because this engineer thinks ahead to tax time, he pays his boy a fair wage, but carefully keeps the annual total under $600. He withholds income tax on these wages, and his son files a return to get a refund because his total income is under $600. Moreover, the father is able not only to deduct his son's wages as a business expense, but to claim an exemption for the boy as a dependent.

Had he permitted his son's earnings to go just one dollar over $600 he would have lost these benefits.

A DRAMATIC example of how record-keeping can serve or strangle an engineer (or any other businessman) is the experience of two young engineers who decided to open their own office.

One was to devote himself full-time to the enterprise, while the other would be only partially active. Each man put up an equal amount of capital, and the agreement was



Strange as it seems, the small businessman often pays more tax than necessary. A slight change in a transaction may make a big difference in the tax liability.

that the active manager would draw $80 a week to begin, while the other would draw only $40. The remainder of the profits was to be divided equally.

Business went well the first year. During the CPA's audit, however, they were told of a startling discovery. Through a bookkeeping error, the full-time partner was about to relinquish over $1,000 of his equity in the business. Why? Simply because the bookkeeper had interpreted the salaries as withdrawals rather than as a method of effecting an equitable distribution of profits.

Once uncovered by an independent accountant, the error was quickly rectified to state the partners' interests in the proper amounts.

It may come as a surprise to professional men to learn that they have a "pricing" problem just as the corner grocer and the hardware store owner do. Maybe engineers do not think of it that way, but pricing is certainly as much an engineer's bugaboo as it is to anyone who is selling goods or services.

Take the engineering firm which was running into a slow period and decided to take on a job at cost in order to keep the organization together. When the score was tallied at the end of the year, accounting procedures uncovered the fact that the job taken presumably at cost was actually showing a whopping loss. The company had failed realistically to figure the overhead involved in that job.

Had they considered their over-all financial position first, they would have seen that work volume to that date was just not enough to cover such a marginal job.

IT is sad but true that many businessmen fail to appreciate the relationship between working capital and records until they have been refused an important bank loan. After a study of thousands of bankruptcy cases, Judge William Clark, Federal District Judge in New Jersey, found that at least three-quarters of the nation's bankruptcies could be avoided and that the most important cause of bankruptcy is the failure to keep proper books. Ninety per cent of the failures studied did not keep books at all.

There is nothing mystical or expensive about proper record-keeping for engineers. For the average small firm, a CPA can set up a system to be administered by the owner himself, with only monthly or quarterly visits by the CPA. An added advantage is that the accountant familiar with the business is then available for consultation on the accounting aspects of insurance and credit matters, to say nothing of negotiations with banks.

In spite of this emphasis on good records, it is foolish to regard the public accountant as a glorified bookkeeper. True, he deals in records, but his is an interpretative knowledge. Because of this increasingly important role in modern business, accounting today is the fastest growing profession in the country. Like the registered engineer, the CPA must pass exacting examinations to earn his credentials.

In dealing with qualified accountants, use their services according to your operation's particular requirements. However, at the beginning of your relationship, there are several general questions to be posed.

THIS list of questions is suggested by the American Institute of Accountants for any engineering firm to ask the CPA when he is first engaged:

1. Am I taking advantage—especially through advance planning—of legitimate tax savings?
2. Are there any overhead or other costs I haven't included in my pricing estimates?
3. Are my finances under control?
4. Have I missed any logical places to shave costs?
5. Do I seem to have adequate insurance coverage?

Keeping too many records in his head is the cause of many a businessman's troubles. A lack of adequate, properly-kept accounting records is responsible for many business failures.

6. Generally, do you think my business is in good health?

If your business is healthy, it will not take long to get these questions answered. If there are any symptoms of illness, you will want to know about them and get to the causes of the trouble.

In either case, professional accounting is a wise investment for professional engineers.—***End.***

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Help Wanted

AIR POLLUTION ENGINEER

The Sanitation Committee of the Common Council, City of Manitowoc, Wisconsin is seeking the services of an Engineer to direct and carry out an air pollution abatement program for the city.

The qualifications for the position are as follows:

1. Graduate from an accredited college or university, with a background in mechanical or chemical engineering preferred.
2. Extended experience in the field of smoke and air pollution abatement.
3. Salary for this position is open, however, it is desirable that the applicant state expected starting salary in letter of application.

Further information or details of this position can be obtained by contacting or writing to Mr. Arthur Post, City Clerk, Municipal Building, Attention: Sanitation Committee, City of Manitowoc, Wis.

Position Wanted

ENGINEER

Experienced in supervising the design of complete mechanical and electrical systems, including heating, ventilating, air conditioning, boiler plants, plumbing and electrical work from basic layouts through completion of field installation. Administrative as well as technical background. Write Box 301, AMERICAN ENGINEER.

BSME EIT with over 1000 hours instruction in electronics. 2 years design experience. Age 26. Desires affiliation with small group of Professional Engineers. Will relocate. Write Box 303, AMERICAN ENGINEER.

Mechanical Engineer, P.E., over 5 years experience in heating, air conditioning, and refrigeration design, desires overseas position. Presently employed. Write Box 302, AMERICAN ENGINEER.

Edwin W. Seeger Is Named Milwaukee's Engineer of the Year

Edwin W. Seeger, NSPE's Central Area vice president, was recently selected as the Engineer of the Year for 1953 by the board of directors of the Engineers' Society of Milwaukee. Mr. Seeger, who is vice president of Cutler-Hammer, Inc., received the ESM citation from President Samuel J. Gates during the joint engineering societies' dinner held February 24th at the Plankinton House. The award was made in recognition of his outstanding lifetime record of contributions to the advancement of the engineering profession.

Penna. Court Holds For Engineer In Building Design Case

A court decision reported as being of significance in the line of cases involving the overlap between engineering and architectural practice has been noted by NSPE Legal Counsel Samuel I. Sacks. The decision by the Common Pleas Court of Erie County entitled, *Conrath v. Delaney, et al., etc.*, involved a suit by a registered engineer in Pennsylvania for the value of his services in preparing plans and specifications for an addition to a market building. The jury returned a verdict for the P.E. but the defendant asked the court to deny the claim because the services which were rendered were those "which belonged to the field of architecture and not engineering."

Judge Laub ruled that "the problem is a factual one since it is conceded that plaintiff may not recover if the work done was primarily architectural and not engineering." Noting that the Architects' Registration Act provides that a P.E. "may do such architectural work as is incidental to his engineering work," and the same is true of the engineering registration act regarding incidental architectural work the Court said: "Concededly the two fields overlap to a point where at times the functions of each become almost indistinguishable from the other. The legislature recognized this as fact when, in the licensing acts, permission was given to each to do such work belonging to the other which is incidental to the actor's function."

The Judge's review of the actual work done by the P.E. found that the removal of a wall was involved and the construction of an addition to the building. This required supporting the roof of the existing building, which would have to be a very careful and intricate operation, so there would be no danger to the lives of the people occupying the store while these operations were under construction, the Court noted. It was also observed that this involved the computation of roof loads, beam loads, column loads and footing loads. "It involved the design of columns or posts which would have to be fabricated for the purpose, and necessitated investigation and knowledge of the weight-carrying capacity of the soil. Desired also was a certain amount of grading and paving for a parking lot and the construction of a drainage system including a small disposal well."

While the work also involved "dress up" to the front of the store and the copy of an architectural style of another building, as well as fireproofing, this architectural work was only "incidental to the main purpose of the employment which, in our opinion, was definitely in the engineering field," the Judge said. "The main purpose was controlling gravity so that the roof and walls would not collapse while remodeling occurred. The other elements, that is, the paving and drainage problems, were obviously in the realm of engineering. One cannot but conclude that the essential purpose of the employment was to investigate, plan and direct the control of the forces of and utilization of the materials of nature and of human activities in connection therewith, the very essence of engineering as defined in the Act. . . ."

The motion for a new trial was denied and the jury decision in favor of the engineer upheld.

Selective Service Acts On Deferment Problem

In an effort to arrive at a formula for solving the ticklish problem of deferments from military service for engineers, chemists, physicists, mathematicians, and other personnel deemed essential by industry, special advisory boards are now being set up by Selective Service on an experimental basis in six states. The state boards will be composed of representative management men and other industrial experts who will be able to provide guidance for local draft boards in deferment requests for such young scientists. Their guidance will be of a strictly advisory character, however, with the ultimate decision left to the local boards.

The states chosen for the experimental program are Alabama, California, Michigan, New Jersey, New York, and Ohio. It will be largely up to each state's director of Selective Service to survey the local industrial picture and determine the choice of the advisory board experts.

At present the program is only in the formative stages, but it is anticipated that the new advisory groups will follow the general pattern of the medical advisory committtees that have been functioning under Selective Service for some time to give advice on deferments for doctors and dentists.

FROM WASHINGTON

By
Milton F. Lunch,
N.S.P.E.'s Legislative Analyst

MILITARY MANPOWER AND SPECIALIZED PERSONNEL

In his State of the Union message, the President declared that "Our defense must rest on trained manpower and its most economical and mobile use."

Everyone can agree with the President's statement, but there is no similar agreement when it comes to translating the objective into practical and definite terms — particularly among the manpower "experts."

Two recent reports from two equally competent and distinguished groups of private citizens point up the substantive differences in philosophy and approach. In a report entitled, "Twentieth Century Minutemen," the National Security Training Commission, headed by Major General Julius Ochs Adler, (also general manager of the New York Times) urges early establishment of a universal military training program to operate concurrently with the draft. The Adler group, of which Dr. Karl T. Compton of MIT is vice chairman, says that a UMT program of six months training for 18-year-olds, plus reserve service for seven and one-half years, would provide a means to correct inequities and inadequacies of the present military reserve system.

Major General Lewis B. Hershey, Director of the Selective Service System, concurs in the finding, but Dr. John A. Hannah, Assistant Secretary of Defense (Manpower & Personnel) believes that the available manpower pool cannot support national training and the draft at the same time.

The chief appeal in the proposal of the UMT group is that it would remove the "double jeopardy" applicable to present reservists and which has, in large part, accounted for the decline in the reservist program. The report said that about 2,500,000 of the 3,500,000 men who reached their 18th birthday between World War II and the start of the Korean war did not see service until June, 1950. As a result more than 600,000 World War II veterans were recalled to duty. The UMT program, it is argued, would build a trained reserve of non-veterans who should be called to active duty first in the event of another emergency.

The committee commented that when the Korean war struck, "older reservists in college were pulled into service while younger non-veteran students were deferred. Farm and industrial workers, scientists, teachers, managers—all were recalled. The selective principle was applied in inducting non-veterans for service but not to veterans recalled for their second tour of duty. Veteran reservists are older, more highly skilled, and more essential to their families, their professions, their communities, and themselves, yet we have made them more liable for service in limited emergencies than non-veterans."

Many professional engineer veteran-reservists will say "amen" to the committee's complaint and many of their employers will echo the refrain, thinking of their specialized personnel who were often taken away from key jobs in defense-related work.

ODM Committee Favors Selectivity

The problem is not so easily resolved, however, according to the report of a special Committee on Manpower Resources, established last August under the chairmanship of Lawrence A. Appley, President of the American Management Association. It is suggested that a decision on the establishment of a UMT program be held in abeyance "since the future, as was the past, is fraught with grave uncertainties in respect to military requirements . . ." It is suggested that even a token UMT program might divert manpower from the established channels of procurement, training and utilization. To this the committee added: ". . . the old concept of military manpower in terms of sheer numbers of people is being replaced by the concept of manpower in terms of special aptitudes and skills —a concept which is fully as germane to building the strength of the national civilian economy." In what may be considered a direct rebuttal to the UMT proposal is the statement that ". . . a program based on a training period which is unsufficient to provide the kinds of military skills most urgently required creates the illusion rather than the substance of a trained military reserve."

This latter point has been one of the strongest in the vocal arsenal of the UMT opponents;

(Please turn the page)

(Continued from previous page)

namely, that UMT would provide an adequate reserve force only on paper—that the six months of training would be meaningless when the men were called to active duty some years later and particularly in a defense age of complicated technologically-developed weapons requiring extensive specialized background and training. To some degree (although oversimplified) this is the disagreement between the defenders of the "foot soldier" force and "Buck Rogers" or "gadget" force.

Some of the comments of the Appley Committee are particularly pertinent to the engineering profession. For instance, it is pointed out that the growth in the number of American men and women having highly specialized skills is one of the most notable developments of recent times. Employment in the professions and kindred occupations increased 15 times over between 1870 and 1950, and stands today at about 5.4 million—nearly 9 per cent of the labor force. According to best estimates, the Committee said, there are about 500,000 engineers in the United States, and it is expected that during the next few years the supply of new engineering graduates will be less than the demand under conditions of partial mobilization and a high level of business activity.

After analyzing the manpower supply and anticipated defense demands in both a general way and applied to specialized personnel, such as engineers, the Committee concludes that what is needed is a system under which "persons possessing skills in short supply are allocated between civilian and military activities in a manner which enables them to make their maximum contribution to the national effort." Throughout the report reference is made to the necessity of establishing "a carefully determined balance between manpower for military service and manpower for defense production and essential civilian activities which must be maintained."

The comment of the Committee along this line is strikingly similar in philosophy to the NSPE policy on military-civilian manpower balance (AMERICAN ENGINEER, July, 1952, for testimony before Senate Armed Services Committee; August, 1953, for NSPE policy statement and legislative situation).

To accomplish the objective outlined above, the Committee recommends the establishment of an "immediately callable reserve" and a "selectively callable reserve." Into the latter category would be placed those with critical skills, undoubtedly including engineers and scientists in view of the Committee's special emphasis on such groups. The specialized personnel in the "selective" reserve would be called to active military duty only on the basis of military need for such skills and after review based on occupational, age, physical, and equity factors considered on an individual basis.

The techniques necessary for determining the requirements of the military services for critical civilian skills should be developed, it is stated. Upon the basis of such requirements, the Selective Service System should induct men having the necessary skills, the Committee advocates. Presumably the Committee is suggesting that both reservists (now under military control) and non-reservists with specialized critical skills be handled by Selective Service. This is a basic departure from a previous legislative proposal that such personnel be under the jurisdiction of a civilian board at the national level and is also somewhat different from the NSPE suggestion that the recall of reservists with specialized critical skills be left under the administrative control of the military but that a joint military-civilian board establish basic policies and criteria for such recalls.

The Appley Committee believes that local and appeal boards of Selective Service have shown themselves capable of exercising reliable judgment on matters within their range of knowledge and experience, but the increasingly technical nature of many occupations requires that such boards be provided with expert advice and strong supporting evidence upon the basis of which they may make valid judgments with respect to the relative need for individual registrants or reservists in military or supporting civilian activities.

There is some cause to believe that this optimism may not be justified as there is a considerable body of evidence that Selective Service boards have not understood the importance or nature of essential civilian work or have declined to be swayed by such evidence. Whether the proposed advisory groups would overcome this tendency is an open question.

It is apparent that the basic policies involved in the overall question will not be easy of resolution by the President or his manpower advisors. He has indicated to Arthur S. Flemming, Director, Office of Defense Mobilization, under whose jurisdiction the Appley Committee operated, that he agrees "in general" with the analysis of the Committee and desires the preparation of a paper dealing with the issues for presentation to the National Security Council not later than April 1, 1954. The President has requested General Adler to team up with Flemming in a further study of the problem of developing "an adequate Reserve establishment."

Evidently President Eisenhower believes the two groups can reconcile their views and provide him with the basis of agreement sufficient to allow him to make good his statement to Congress in the State of the Union message that "evident weaknesses exist in the state of readiness and organization of our reserve forces. Measures to correct these weaknesses will be later submitted to the Congress."

Professionalism or Unionism–Facing the Issue

By T. Carr Forrest, Jr., P.E.
President, National Society of Professional Engineers

THE issue of professionalism or unionism in the engineering profession is today's challenge to the professional engineers of America. It is a challenge which must be quickly and decisively resolved.

Having just recently completed an extensive tour of the United States, visiting with and speaking to many individual professional engineers, as well as Chapter and State Society meetings, I have been surprised to find a large portion of the profession completely unaware of this issue.

What is the nature of this problem? It is simply whether the engineer will remain a professional man and advance as such, or whether he is going to allow the unionism philosophy to represent him in all his affairs as the device for resolving his economic problems. All side issues such as the theory of the "professional union," are mere side-stepping arguments which beg the main question.

NSPE's position is clear and unequivocal. As a Society we have stated that "it is definitely unprofessional for a professional engineer, professionally employed, voluntarily to join a heterogeneous labor union, dominated by, or obligated to, non-professional groups." As long ago as 1948, our Society declared that "the individual responsibility and independent judgment required of a professional engineer are incompatible with the regimentation fundamentally inherent in unionization." Our statement clearly indicates that labor union affiliation necessarily means the sacrifice of professional status. And I would take it that our position includes the so-called "professional" unions as well as the trade unions.

Let us make it clear that the Society takes no position in matters dealing with the unionization of industrial workers and craftsmen. These are considerations out of our purview.

The naked issue then is whether the temporary economic benefits the unions claim they can obtain for professional engineers are worth the long range loss of professional status. NSPE believes that we cannot have our cake and eat it, too; we must make our choice. Some members of the profession are committed to the union philosophy, a greater number have clearly indicated their preference for development through professional societies, and the largest group stands in the middle, uncommitted to either position as evidenced by their failure to join either a union or a professional society.

The idea of unions for engineers is not a new one. Union activities for professional employees can be traced to the period immediately following World War I when the American Association of Engineers organized and directed a collective bargaining campaign for professional engineers before the U. S. Railway Wage Board in the interest of technical employees of the railroads. That the issue of professionalism vs. unionism is also not new is illustrated by the statement of AAE that ". . . our action stirred up animosity; brought on us the suspicion of employers that we were a 'glorified' labor union . . ." And it is also interesting to note the parallel of 1919 to today; ". . . the entire campaign conformed to the highest principles of professional conduct." So it is seen that the idea of the "professional" union also is not particularly new.

IN the years which followed, unions of engineers came into existence from time to time, but it may be observed that they were not regarded by the profession as anything more than a "fringe" element until the past decade. Unfortunately, the adoption of the Wagner Act in 1935, preceded by the collective bargaining mandate of the National Industrial Relations Act, hastened and encouraged the development of engineering unions, to some extent due to the failure to provide different treatment as between production workers and professional employees.

The Taft-Hartley Act of 1947 corrected this deficiency, providing that those defined as "professional employees" must be given the opportunity for determination of their desires on collective bargaining (and decertification questions) by a separate unit vote confined to the affected professional employees. This was a major step forward and reflects credit on the many engineering societies which participated in the work to obtain the much-needed reform. With this provision in effect we have largely eliminated a legal situation which permitted professional employees being forced into trade unions.

A development which has brought the issue to a head occurred in 1952 when representatives of independent engineering unions formulated a national federation of such groups—known as Engineers and Scientists of America (ESA). This group has announced ambitious plans to organize all professional engineering employees into their constituent unions and to organize student chapters on the campuses to inculcate the spirit of unionism among the engineering students.

Some rather loose figures have been widely circulated regarding this group. During my recent travels I often encountered the statement that ESA has 40,000 members. This magic figure came into being based on the claim that the ESA units at the time the organization was founded *represented* 25,000 professional engineers and "other professional units having 15,000 eligibles" which had applied for admission. There is a vast differ-

Ohio Society of Professional Engineers—Annual meeting. March 26, 27. Mayflower Hotel, Akron, Ohio.

Illinois Society of Professional Engineers—Annual Meeting. March 25-27. Broadview Hotel, East St. Louis, Illinois.

New York State Society of Professional Engineers—Annual Meeting. May 5-7. Hotel Commodore, New York, New York

Pennsylvania Society of Professional Engineers—Annual Meeting. May 7, 8. Bedford Springs Hotel, Bedford, Pa.

New Jersey Society of Professional Engineers—Annual Meeting. May 7, 8. Hotel Ambassador, Atlantic City, New Jersey.

ence between the number represented and the number who are members of a union. A union certified for collective bargaining at a particular plant or company may "represent" all the professional employees if a bare majority of the group vote for such representation, but this does not indicate that any particular number are *members* of the union.

The recent high demand for engineers has encouraged organizers to become more active in attempts to expand technical unions which sometimes are found under a misnomer with the word "engineer" in the names of their organizations. For, in truth and fact, the percentage of members, who can qualify by law as engineers, is extremely small. It is indicated from reliable sources that the actual membership of ESA is in the neighborhood of 13,000, not all of whom are professional engineers. From the standpoint of registration as the criterion of professional status, it is understood that ESA officials admit that less than ten per cent of their members are registered under the state engineering registration laws and some estimates have placed this statistic as low as three per cent.

One other union group requires mention—the American Federation of Technical Engineers, affiliated with the American Federation of Labor. This group, while using the word "engineer" in its name appears to have practically no membership among professional engineers, being confined to technicians or machinists of one kind or another. The professional philosophy of the AFL union can be gleaned from its statement before the Wage Stabilization Board: ". . . in modern industrial management the engineer is more closely akin to the machinist at his lathe and the production worker on the line." Insofar as membership is concerned, this is another group which does not announce actual membership figures. But the 1953 Directory of Labor Unions in the United States, published by the U. S. Department of Labor, lists the membership at 6800.

SOME important thinking on the unionism question will be found in the report of the Professional Engineers Conference Board for Industry, "How To Attact and Hold Engineering Talent." Chapter VI, titled, "What About Unions?," indicates that of 1400 professional engineers (including engineers-in-training) employed in industry, 66% do not want union representation and only 3% belong to unions.

A survey conducted by the American Society of Civil Engineers, covering approximately 17,000 members, revealed that 63% are opposed to collective bargaining.

These findings indicate that a substantial majority of the profession have not been deluded into thinking that unionism is the answer to their problems, but they do indicate that a substantial portion of the profession are at least "flirting" with unionism.

Why do we say that professionalism and unionism are incompatible concepts? Examples, rather than philosophy may provide a more impressive answer.

In recent months a large eastern newspaper carried the headline, "RCA Engineers Announce Strike." The next day the headline was: "RCA Engineers Call Off Strike." The point here is not whether the engineers were right on the economic questions involved or whether management had taken an unjustified position on certain points in the dispute. Here was a case where a union of professional people called upon their weapon of last resort to force their point of view. Regardless of the issues, can professional people go before the public one day in terms of strikes and picket lines, such as are used by production workers, and go before the public another day, as we do during National Engineers' Week, talking of public service and asking for public blessing and recognition as a learned profession?

Another engineering union and another company had a dispute and the newspapers announced to the public that the engineers had "struck." The public was also told that representatives of the Defense Department were alarmed over the loss of vital defense production and that the situation was becoming "increasingly critical." What sort of professional impression can we make on the public when the interests of a striking group of professional men is put before the defense of the nation? We do not need to pass judgment on the claims of the strikers to know that the public will not and cannot understand such actions from "professional" men.

The engineering unions contend that they can operate in a professional manner and without sacrifice of the individualism which is inherent in a profession. But a review of a collective bargaining agreement between one of the nation's largest employers of engineers and the engineers' union, a 58-page document, indicates coverage of everything from standard work schedules to vacations, from general adjustment in rates of pay to layoff allowances, from occupational classifications to professional standards, and on and on to the extent of 35 separate subjects which govern the daily working life of the professional employees. When an individual professional engineer is "represented" by force of law and collective bargaining agreement to the extent of almost every phase, detail and aspect of his professional activities, it cannot be successfully maintained that collective bargaining is compatible with professional status. If professional development and advancement are to be regulated in 35 ways the individual may or may not climb the professional ladder, but he will climb it, if at all, only on the rungs which are contained in the "agreement" and he will climb it no faster than the "agreement" permits.

IF professional engineers are fair game for unionism they are fair game for all kinds of unionism. The trade unions will not idly sit by if engineers are to be organized without putting their finger into the pie. Such an endeavor is now taking place among engineers and surveyors working for contractors building the Ohio Turnpike, and the organizational efforts of the trade union appear to be spreading to other states. The trade unions have more experience and power than the so-called "professional" unions. And if the individual professional engineer is looking only for immediate economic gain at the expense of all else, why should we assume that he will not cast his lot with trade unionism rather than "professional" unionism?

It is also self-delusion to think that "professional" unions can effectively operate outside of the traditional rules and without the traditional weapons of trade unionism. We have already observed the use of the strike and the picket line by "professional" unions, and whether they desire it or not, they will have to resort to boycotts, featherbedding, compulsory membership and all the other usual methods.

A recent article by Dean W. R. Woolrich, president, American Society for Engineering Education, (AMERICAN ENGINEER, April, 1953) listed the following effects of unionization of engineers:

1. **Individual initiative would be restricted.**
2. **Individuals would be regimented by the union organization.**
3. **A "typing" of engineering positions and a "leveling" of salaries would result.**

4. **Professional status and prestige of engineers would be damaged if not lost entirely.**
5. **Individual advancement and recognition of individual achievements would be stifled.**

This is an age of organization and group action. Nothing we say or do can change this condition. What then can the engineering personnel of industry do to advance their professional and economic status short of unionism? They can, it is submitted, start with the premise that all engineers in a particular company, supervisor or employee, are part and parcel of one and the same profession. They can affiliate as a professional group to discuss, consider, work on and in every other way deliberate together about their problems as professional people. They can educate each other and management; they can recommend suggested changes of procedure and status. They can, in short, apply intellectual engineering thinking to their professional interests. To say, as the unions do, that management will not heed such constructive and cooperative approaches is to fly in the face of experience. American industry has advanced just because of such mutually profitable activity and not by being arbitrary and without regard for constructive thinking.

There are technical obstacles in the way of a greater development of non-bargaining engineering organizations and NSPE has sponsored an amendment to the Taft-Hartley law to remove the obstacles. Whether this legislative effort will succeed depends in large part upon the active support of the members of the profession, as well as those industries whose growth depends upon technological know-how. It is our purpose to bend every effort to obtain the needed change, which we call the "Freedom of Association" amendment. We are convinced that it will open a new vista for meeting the profession's problems in the industrial field.

The other thing we can and are doing is to obtain a sympathetic understanding of the problem of engineers in industry, to cooperate with them and to seek solutions to those problems on a variety of fronts, including ever-closer contacts and understanding relations with management. The recently formed NSPE Engineer in Industry Committee is dedicated to this task and has developed an ambitious and practical plan of worthy endeavor.

When industrial organizations employ engineers on assignments of a sub-professional or clerical character, the end result is likely to be frustration, retarded professional development and at least the danger of opening the door to the acceptance of the collective approach inherent in unionism. In these times of high demand for engineering manpower, industry can ill-afford to use these professional talents for other than truly professional work.

INDUSTRIAL America needs the engineer in its business more than ever before. Industry cannot stand still. It must continue to make improvements in the products it sells. It must keep moving forward rapidly on research and in the development of new products to take the place of old ones that have lost their lustre.

The basic ingredient in the complex industrial colossus that typifies the United States today is engineering know-how. Know-how in research, know-how in design, know-how even in the design of new tools which may be necessary to efficiently and economically assemble the new product. As a result of all this, industry is rapidly turning to the engineering profession for administrative and executive leadership. Why? Simply because it is this kind of person who can more readily grasp the significance of research, design, manufacture and sale of the product.

By following this philosophy, which is borne out by the ever-increasing number of engineers in industry (now as high as one in twenty), I come to the natural conclusion that *all* engineering phases of industry from the new graduate on up is a part of management. The engineer creates and designs the product, he designs the machinery to make it and he instructs the public in the use of this same product. It is his brain, not his muscle, that is integrated into the complexities of a modern industrial plant.

My experiences of recent months have convinced me that we face a major problem and that we must meet it head-on; it has equally convinced me that with the determination of the engineering profession to remain a profession we can achieve our goal of continuing professional development and public service.—***End.***

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Eisenhower Atomic Plan Endorsed by National Society in Albuquerque

THE board of directors of the National Society of Professional Engineers, at the Spring Meeting in Albuquerque, New Mexico, February 18-20, at the Hilton Hotel, gave unanimous and enthusiastic endorsement to President Eisenhower's recent proposal for the development of an international agency to devise methods whereby atomic materials may be allocated to serve the peaceful pursuits of mankind.

"The successful implementation of the Eisenhower proposal, as we have pointed out in our resolution," said NSPE President T. Carr Forrest, Jr., in commenting on the board's action, "would give the engineering profession a new and challenging opportunity to fulfill its mission of service, particularly since the successful use of atomic energy for peaceful purposes depends largely upon the engineering and other scientific talent in the United States and other free nations. Too often we engineers and scientists are unfairly blamed for the sorry state of world affairs because technological advances have produced such devastating weapons as A-bombs, H-bombs, the super-planes that can deliver these instruments of destruction, atomic artillery, and the like. But actually our concern for peace is as urgent as that of anyone else, and endorsing the President's atomic energy plan is one important and effective way of showing it."

The various committee reports heard throughout the course of the meeting included those of the Budget, Constitution and Bylaws, Education, Employment Practices, Ethical Practices, Legislative, Membership, National Defense, Publications, Public Relations, Registration, Resolutions, Young Engineers, Awards, Building Advisors, Chapter Activities, Compendium of Registration Laws, Engineer-in-Industry, Interprofessional Relations, National Affairs, and Salary and Fee Schedules Committees. NSPE President T. Carr Forrest, Jr., presided at the general business sessions of the board during which the reports were delivered.

One highlight was the report of the new Engineer-in-Industry Committee and the approval of two suggested activities of the committee. As a result, the committee has been authorized to meet with management representatives with a view to exchanging ideas which would be helpful in working out a program for the improvement of the status of the employed engineer. Among the management people who will meet with the committee in this regard are men from consulting firms, electrical manufacturing companies, construction material firms, and the rubber, steel, petroleum, and chemical industries, as well as representatives from other fields.

Following the meeting of the Engineer-in-Industry Committee and the management representatives, the committee has been authorized to publish an informative booklet which will present the items covered by the discussions, although it will not constitute an NSPE policy statement.

In another important action, the board adopted the so-called "Plan B" for telephone listings. The plan approves listings as in the following sample:

ENGINEERS—REGISTERED PROFESSIONAL

CIVIL

John Doe . . . . . 400 Dexter Avenue . . . . . Anyplace 9600

ELECTRICAL

John Smith . . . . . 100 Main Street . . . . . Anyplace 5500

ALSO accepted was an amendment to the Bylaws (Bylaw 2-J) to provide that where a State Society is entitled to more than one vote on the board, the National Society will pay the expenses of one national director for each two full votes. This provision for additional compensated attendance of national directors replaces the present provision allowing payment for only one national director from each State Society regardless of the number of members in the state group. The new provision will become effective for meetings occurring after January 1, 1955.

Vice President C. Y. Thomas, who is also chairman of the compendium of Registration Laws Committee, gave a status report in which he announced that the first edition now being prepared by former Missouri State Senator A. L. McCawley, will probably be ready about the first of August.

Chairman of the Public Relations Committee, Vice President E. W. Seegar, reviewed the publicity achieved through the Third Executive Research Survey Report — "How to Attract and Hold Engineering Talent." And consideration was also given to the possibility of developing a fourth report on the training of engineers in industry. Those in attendance were also brought up to date on Engineers' Week programs scheduled on both the national and local level. The NSPE-produced Engineers' Week film, "Pilgrimage to Mount Vernon," was shown to those present, as was a professionally-acted public relations film put out for the Texas State Bar Association.

The report of the Legislative Committee covered such topics under study as proposed Taft-Hartley Act Amendments, Social Security, tax legislation, advance planning of public works, and manpower legislation. The board directed the Legislative, National Defense, and National Affairs Committees to study the latest proposals in the manpower field (see "From Washington," p. 21) to keep the Society up-to-date on all developments.

The report of the Membership Committee was received, and the various changes in membership totals were called to the attention of the board.

THE 1953 program was reviewed and plans for membership promotion in the remainder of 1954 were discussed. The committee's report stated that the percentage of increase as of the end of 1953 was 12.6 per cent, the highest figure in the past five years.

The budget was reviewed and an officially-revised version was given approval. Of the total 1953 carry-over of $14,900 cash, $5,400 was transferred to the reserve fund and $9,500 was added to the 1954 budget, making a total 1954 budget of $311,500.

The new Unity Committee was given $2,500 as its initial alloca

tion. Of the $15,000 scheduled for rent and services, $12,000 was allocated to current regular rent and services, while $3,000 was allowed for new headquarters building expenses. The budget item for *American Engineer* advertising representation was increased by $4,000 as part of the effort to step up the advertising program.

The program of regional luncheons, which has proved so successful at other National Society meetings, was continued for the Albuquerque session, with the various vice presidents presiding at the luncheons for members from their areas.

The NSPE meeting was held in conjunction with the annual meeting of the New Mexico Society of Professional Engineers. Outgoing President Otto H. W. Blumé presided at the New Mexico business sessions.

FOLLOWING the counting of the mailed ballots at an NMSPE board meeting, new officers for 1954 were announced and their installation took place. The '54 slate includes: Thomas E. McCarty, district engineer for the State Highway Department, Albuquerque, president; Charles G. Caldwell, first vice president; David I. Lloyd, second vice president; Dr. T. T. Castonguay, secretary-treasurer; and Walter J. Dolde and Ray J. Foss, directors. The terms of the two new directors will be for three years.

State Board of Registration members were honored guests at the Saturday luncheon arranged by the NMSPE, during which P.E. certificates were presented to new registrants. The Registration Board members present were Chairman Daniel B. Jett, Carl R. Albach, Burton G. Dwyre, E. B. Bail, and John Erickson. Dr. E. J. Workman, president of the New Mexico Institute of Mining & Technology, was the guest speaker for the occasion.

Other guest speakers during the course of the meeting included the Hon. Clyde Tingley, chairman of the Albuquerque City Commission, who welcomed the NSPE members to the city, and Dr. James W. McRae, president of the Sandia Corporation, who spoke at the annual banquet.

Walter K. Wagner served as general convention chairman. Other committees were staffed as follows: *Program*—M. F. Fifield, chairman, and Kenneth W. Mount; *Registration*—Wm. P. Ellermeyer, chairman, and Lloyd Sallee, Cleve C. Ketcham, James H. Ryan, Jr., Walter F. Scott, James Culbertson, and Joseph Black; *Finance*—Wm. V. Gilpin, chairman, and Rex A. Tynes and T. E. McCarty; *Displays*—Francis Burton, chairman, and Charles E. Barnhart; *Publicity and Advertising*—Wm. C. Wagner, chairman, and Otto H. W. Blumé, Ernest W. Hall, and George S. Johnson; *Speakers and Guests*—Howard A. Person, chairman, and A. Burton Metzger, E. B. Bail, R. W. Fife, and John J. Plese; *Music and Entertainment*— Robert M. Yearout, chairman, and Hugh F. Munn and Robert P. Scott; *Hotel Arrangements*—Kenneth G. Overby, chairman, and Charles G. Davis, F. E. Henry, Wade F. Perry, Senesio Torres, and Lewis W. Jamme.

Albuquerque Meeting Featured Bright Social Events, Too

In addition to the regular sessions devoted to official Society business, the NSPE Spring Meeting in Albuquerque, New Mexico, featured many enjoyable social events for the NSPE members and their wives who attended.

A "get-acquainted" hour Friday evening at the Alvarado Hotel was the first such event attended by both the engineers and their ladies. It was followed by a buffet supper, for which M. F. Fifield served as master of ceremonies. The Saturday luncheon, also at the Alvarado, at which outgoing NMSPE Vice President Howard Person presided, was also an enjoyable social session that included some business in the presentation of certificates to new registrants. Dancing followed the NMSPE annual banquet on Saturday evening in the Hilton Hotel ballroom.

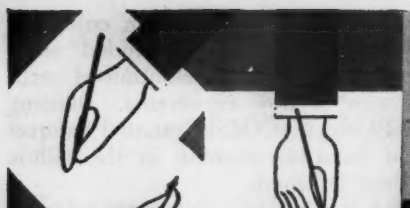
A special ladies' program was also arranged under the direction of Mrs. Fred J. Fricke. The members of her committee included Mrs. E. B. Bail, Mrs. C. E. Barnhart, Mrs. L. H. Chant, Mrs. C. H. Clarke, Mrs. E. P Dillon, Mrs M. E. Farris, Mrs. M. F. Fifield, Mrs. D. I. Lloyd, Mrs. A. D. Loftin, Mrs. T. E. McCarty, Mrs. L. R. Neibel, Mrs. J. J. O'Connell, Mrs. O. H. Roehlk, Mrs. R. P. Scott, Mrs. W. T. Stevens, Mrs. W. C. Wagner, and Mrs. W. K. Wagner.

New Officers Installed In Galveston

The following officers for 1954 were recently installed by the Galveston County Chapter, Texas SPE: F. K. Webb, Jr., president; A. W. Guill, first vice president; M. C. Wilson, second vice president; and J. F. Draffen, secretary-treasurer. Current members of the chapter's executive board include K. A. Campbell, A. W. Gilbert, E. F. Kinzer, R. H. Koehler, E. G. Lantz, E. M. Grimes, and P. J. Hurd. Mr. Hurd is the immediate past president of the group.

Add Engineers' Week: Nation's Capital

Dr. David E. Walter, left, Chairman of the National Engineers' Week Committee, District of Columbia Society of Professional Engineers, holds the proclamation by the Commissioners of the D. of C., proclaiming the Week. In the center is Mr. Renah F. Camalier, one of the three Commissioners, and on the right is shown Engineer Michael F. Godfrey, Secretary of the local Society.



Professional POSTSCRIPTS

This is your department. Your contributions to it are solicited. We want your views on subjects that affect the engineering profession directly or indirectly. Please keep your contributions short, and remember that editing may be necessary to conserve space. Your name may be omitted if you desire.—*The Editor.*

First out of the mailbag this month is a letter from Engineer Milton D. Rubin of Newton, Mass., and with it comes an editorial from the *Boston Daily Globe*. It's about inventors and inventions and therefore of interest to the majority of engineers. Here, then, is Engineer Rubin:

—PP—

The NSPE must take a firm stand alongside the inventor. What is injurious to the independent inventor is injurious to the Professional Engineer.

With regard to the proposal to increase patent office fees, the editorial from the *Boston Daily Globe* printed below expresses my sentiments very well.

The fees should not be raised but lowered, and in every way procedures should be overhauled to make it easier for the deserving inventor to get his patent.

In fact, the NSPE could very well take a deep interest in any commission formed to study patent procedures. We cannot depend on the patent attorneys to take too deep an interest in simplification; it is to the advantage of the inventors that the procedures be rationalized:

To Promote Progress

Invention is one theme that has held popular interest in this country since the day of the Founding Fathers—who took care to include it in the Constitution. What American family doesn't count among its domestic folk tales at least one about Uncle Eben, who actually invented the lawn mower, or the collapsible paintbrush? Or Cousin Samuel, who came within an inch of fabulous wealth never achieved because at the crucial moment in his tinkering in the back room of the barn, lumbago incapacitated him?

The inventive urge, largely derived from the traditions of frontier settlement and the ingenuity required for survival or comfort, is still one of the most firmly based characteristics of our people. It has provided one of the foundations upon which the growth and strength of the nations have developed.

Any interference with this trend is unlikely to prove popular, and the proposals put forward by Director of the Budget, Mr. Dodge, to hoist the fees charged inventors for getting their handiwork patented, appear to fall squarely in that category. Mr. Dodge's aims are admirable. In his endeavor to put as many government agencies as he can on a pay-as-you-go basis, his eye has lighted upon the Patent Office.

That important agency is again asking for an appropriation of $12,000,000 to conduct its affairs during the coming fiscal year. Each twelvemonth, from fees paid by aspiring inventors and for other services, the Patent Office takes in approximately $6,000,000, which is turned over to the Treasury. In other words, the net cost to the taxpayer each year is about $6,000,000. Mr. Dodge wants the difference made up by raising the present $60 fees, paid by seekers for patents, to about $180.

This will seem poor economy to thoughtful citizens. Surely anything that places more financial hurdles in front of the originator of technological devices designed to help society in its diurnal rounds runs counter to our traditions, and, in the long run, our national interest. The proposal is the less enticing for another reason which alarmed champions of the inventor are already stressing.

It isn't the work done by the Patent Office in examining and certifying inventions that creates this $6,000,000 deficit. It is other services performed at inadequate fees, and for no genuine public benefit. The patent seekers turn in most of the $6,000,000; the others turn in the deficit that worries Mr. Dodge.

Not all inventors get off with payment of the $60 fees, however. Many, because of their inventions, run into protracted legal disputes involving patent lawyers, costly court proceedings and other headaches. An inventor colliding with a high-powered corporation, determined to squeeze him out as a menace to monopolistic control of patents in its own field, faces formidable difficulties.

Indeed, an increase in fees for inventors isn't what our patent system needs so much as a thorough overhauling of the whole structure to eliminate abuses become glaring in the past few decades. The basic Patent law, for instance, has remained substantially unchanged since 1870. Meantime a whole world of modern technology, industrial concentration, expanding science and economic change has unfolded.

In 1950 the Supreme Court, in a famous decision, sought to correct one abuse by denouncing the issue of patents on all kinds of gadgets, regardless of their bearing upon the Patent Office's function, which, the Constitution stipulated, must "promote the progress of science and the useful arts." That decision proved beneficial; it made harder the way of the spurious claimant to a patent.

The larger task remains: to correct the law and procedures that occasionally have caused the existing patent system to become an obstacle to national security. Meantime, let us rear no new financial barriers to the individual inventor, but encourage him. It is not the 100 indifferent inventions that matter, but the 101st, which may open new horizons in technology or in living.

Uncle Dudley.

—PP—

The threat of unionization is one of the most serious problems facing the engineering profession. (*See NSPE President Forrest's article, page 23, this issue.*) We are pleased to print below a letter from Engineer W. H. T. Holden giving his thoughts on this question. Engineer Holden:

—PP—

The old question of unionism versus professionalism seems to be with us again. Most recently it has arisen because of the activities of a group calling themselves the Engineers and Scientists of America. Except for a few of the fuzzy minded, left wing type, it is my personal conviction that the majority of this group are neither engineers nor scientists but draftsmen and other types of technical assistants who frequently and illegally claim the status of engineers.

The stand of the New York Society has been consistent and goes back to a period prior to the organization of NSPE. It is simply "Unionism is inconsistent with professional status." I have read the NSPE statement on this and while it starts in the same way there follows a masterpiece of weasel wording that very seriously weakens the stand.

More recently, NYSSPE recommended that NSPE support legislative action by the Congress to take the engineer out of and exempt him from the application of the Taft-Hartley Act. It is understood that this was not approved by NSPE in a National Directors meeting. The reason given was that this would deprive the engineer of freedom to seek union status. NSPE is supporting the Kearns freedom of association bill, which sounds to me as if someone wants a union of engineers to include supervisory as well as non-supervisory personnel.

This issue is one over which I can see no room for any respectable difference of opinion. If an engineer is a man having professional status, he

cannot join a union without loss of that status in fact, whether the law so reads or not. In claiming professional status he has incurred the loss of the freedom to do some things permitted to the non-professional. One of these is the freedom to join a union.

Owing to the unsatisfactory state of the law today we have the situation where men who are professional engineers are forced into unions. Certain corporations have permitted this and the professional engineers should be advised of the names of these firms and advised against accepting or retaining employment therein, until the professional engineers there are freed from unionism.

There is a second situation that also warrants our attention. What about the professional engineer who voluntarily joins a union or who attempts to set up a union composed wholly of engineers? It is obvious that such action is in direct violation of any claim to professional status, and it is my belief that such action would warrant the State Board of Registration to move to revoke the registration of such a man on a charge of unprofessional conduct. It is my further belief that NSPE should definitely prohibit this type of union activity as well as any other types, to its members under penalty of expulsion from NSPE.

The issue is clear—No professional engineer or other person claiming professional status, such as a lawyer or a doctor, can organize as a union and bargain on threat of a strike if demands are not met without immediate and automatic loss in fact of his claim to professional status. No society of professional men can condone unionism without vitiating its claim to represent a profession.

—PP—

Remember —PP— is your department. It is your "soap box"; a place where you can "stand up and be counted." NSPE is proud of its three-level organization and feels that its real strength lies in its "grass-roots" democracy. NSPE is daily engaged in programs that are designed to solve some of the pressing questions that have long bothered the engineering profession. Why not do this: On pages 26 and 27 of this issue the reader will find a report on the recent Board of Directors' meeting in New Mexico. It is a report to *you*, telling what *your* Society is doing. Why not read this story and then let —PP— have your reactions to the Society's program of progress?

See you next month!

Eisenhower's Remarks to Press Recall NSPE Resources Statement

An intriguing political question is whether Governor Dewey of New York can stop final Congressional approval of legislation to permit five private power companies to develop the Niagara Falls Power Project. The House has passed the private company legislation, but Dewey's intervention in favor of State development prevented Senate approval in the previous session.

The New York Governor recently visited President Eisenhower to present his position and presumably to seek presidential support. How persuasive he was may be judged by President Eisenhower's comments at a recent press conference at which the following questions and answers were given on the subject. The opportunity to quote the President in full on any subject at a press conference is rare. The President authorized full and direct quotation of his entire press conference of the above date.

Q. (by Alan S. Emory, Watertown, N. Y., Daily Times)—"Mr. President, Governor Dewey told us last Friday that he had laid out the facts of the State's case on Niagara power development in his conference with you. I wonder if you would tell us if he did a good selling job?"

President Eisenhower.—"He merely laid out to me what he was going to do and place before the people that have the responsibility in this regard.

"As you will recall, in the case of the Niagara River, Congress reserved to itself at that time the power to make the decision as to the method by which that power would be developed.

"He merely described to me what New York's position was in the thing and what he was going to do.

"He asked me—he didn't apparently attempt to sell me anything; he just told me some facts he was going to tell someone else."

Q. (by Miss Marietta Dake, Niagara Falls, N. Y., Gazette)—"Mr. President, if it were up to you, do you favor the development of the Niagara River by the Federal authority, the State authority, or private enterprise?"

President Eisenhower—"I just remarked that Congress reserved this to itself. I don't believe I will comment on it in detail except to say this: I have always believed that States have a very great power of decision in these cases as to what they want to do.

"Now, in rivers and water lines and other things that involve all the United States, the Federal Government cannot dodge, and should not try to dodge, its share of the responsibility, its partnership in the case.

"Here, where you have a river that I believe is wholly within New York City, I should say—I mean within New York State—that New York State ought to have a very great influential part to say, but I am not going to be here and say Congress hasn't a right to do it exactly as it said it was going to do it."

In this connection it is interesting to recall that, in June 1952, NSPE's Board of Directors issued a policy statement on natural resources development indicating that the Society "favors the use of private enterprise in the development of our natural resources guided by sound principles of conservation and points to the Niagara Power Development and the Hell's Canyon Project on the Snake River as instances wherein legislation is being considered that violates this principle."

NSPE has taken a position (see box above) in favor of the private development legislation and has urged Congress to approve the legislation for this purpose.

Aids To Small Business Operations Available

The Small Business Administration has announced that several aids are available, geared to the agency's function of promoting the interest of small business. Several of the aid series are of direct interest to engineers.

A small pamphlet, "Small Business Administration—What It Is—What It Does," will be sent to those requesting it. Other information items include: Technical Aids for Small Business, a series on a variety of technical subjects; Management Aids for Small Business; and a Small Business Management Series, covering such subjects as Cutting Office Costs, Human Relations, Better Communications, Accounting, Materials Handling, and Employee Suggestion Systems.

Requests for materials or information should be addressed to: Small Business Administration, Washington 25, D. C.

N.S.P.E. Believes

ABOUT COMPETITIVE BIDDING

BY PAUL H. ROBBINS, P.E.

Executive Director

N.S.P.E.

THE State Highway Commissioner in one of our southeastern states, several months ago inserted an ad in some of our leading technical publications calling for bids for engineering services for construction projects being developed with state funds. Following the publication of this advertisement, protests were received by at least one of the magazines carrying the advertisement and extensive discussion on the subject has ensued in engineering circles.

Consideration of this important problem led to several editorials, one of which offered the suggestion "for the profession to sanction the submission of competitive proposals for engineering engagements under conditions that will minimize the possibility of an award being made on the basis of price alone." This editorial aroused a storm of protest from members of the engineering profession who have so long considered the practice of competitive bidding not only as unethical but as a considerable danger to the future development of engineering as a profession.

Apparently the proponents of the point of view taken by the editorial arrive at their conclusion because there are in existence in some few states and localities certain laws which require the administrators of those laws to follow this practice. The acceptance of these restrictions and an endeavor to develop policies by which such practices can be continued cannot be condoned by NSPE. A number of years ago a committee of NSPE presented a very carefully worded statement of policy to the Society. After extensive review, the Society adopted this statement as its policy on competitive bidding. The statement itself explains the reasoning behind the position of engineering, as all professions, to oppose the selection of those competent to provide professional services, on the basis of who will offer them at the lowest price. The NSPE statement is as follows:

"The Practice of Engineering is a learned profession, requiring of its members sound technical training, broad experience, personal ability, honesty and integrity. The selection of engineering services by an evaluation of these qualities should be the basis of comparison rather than competitive bids.

"Competition between engineers for employment on the basis of professional fees or charges is considered unethical practice by all professional engineering groups. Hence, the announced intent of an Owner or Governmental Body to request such competitive bids removes from consideration many engineers who may be the best qualified to be entrusted with the proposed work.

"Since the securing of competitive bids for professional engineering services is not in the best public interest and as such procedure frequently results in the awarding of the work to other than the best qualified engineers, the National Society of Professional Engineers does now and herein express itself as opposed to competitive bidding for professional engineering services and of favoring the practice of negotiating of contracts in all cases where it may be necessary or desirable to consider the services of more than one engineering consultant or organization."

To support the point of view that such a position is unrealistic because of the existence of certain laws is to take a defeatist attitude. It is undoubtedly true that the majority of these laws are drawn in an endeavor to protect the public from unnecessary or exhorbitant charges in the purchase of things for which the government has use. However, the need for competent engineering services certainly cannot be compared with the purchase of nuts, bolts, and other supplies. The public is entitled to the best professional advice it can secure by way of engineering service. To compare the value of engineering services on the basis of competitive bidding assumes that the ability, experience, and competence are equal for all those who submit bids. It is obvious that such is not the case.

It seems equally short-sighted to believe that because there are these certain restrictions developed as they have to be in broad general terms, they therefore must of necessity forevermore apply to the engineering services required by public bodies. Laws may be changed. Legislators and administrators are reasonable people. In almost all cases when the facts concerning the securing of professional services are placed before these individuals, they regret the restrictions such laws may prescribe.

Thus, NSPE would propose that, rather than accept as inevitable these restrictions, the engineering profession should unite in an effort to acquaint those within whose authority the responsibility falls for making any changes with the full degree of professional work involved in engineering, and to work diligently to place upon the law books and in administrative regulations necessary breadth of decision to permit the selection of the most competent professional engineering service.—***End.***

Winter-weary? Plan a Trip to Wisconsin!

From Kickapoo to the Dells—You'll Love Wisconsin. Why Not Plan a Vacation Trip Now That Will Include a Visit to Milwaukee and NSPE's Annual Meeting, June 9-12?

Live a Little—Visit Us In Wisconsin!

By Robert W. Smeaton, P. E., Milwaukee Chapter, Wisconsin SPE

HERE'S your excuse to be in Wisconsin early in June. The twentieth annual meeting of NSPE will be held in Milwaukee, June 9, 10, 11, and 12, 1954. Be sure to arrange your vacation so that you can drive with your family through Wisconsin a week or two before the meeting. You will find the nation's dairy state at the height of its blossom time. If you are coming from the south or west, be sure to drive through the Kickapoo Valley and see the 800 acres of apple blossoms.

While in the area, why not visit Madison, the state's capital? This beautiful city is built on an isthmus only a few blocks wide between Lake Monona and Lake Mendota. On a hill overlooking the town is the beautiful campus of the University of Wisconsin. The Forest Products Laboratory, nationally known for its research and experimental work, is also located in Madison. Interesting tours through the Laboratory can be arranged. Not far from the state capital is the famous Cave of the Mounds, outstanding for its myriad subterranean rock formations.

A few miles north of Madison is another geological marvel, the Wisconsin Dells. Here the Wisconsin River and its tributaries have been cutting through soft sandstone rock for many centuries to form hundreds of grotesque rock formations, some almost unbelievable. Caricatures of human faces, animals, and other shapes in a rainbow of color can be seen from the river. There are numerous daily boat trips to view the Dells' rock formations. A near-by natural amphitheater with exceptionally good acoustics, is another special feature of the Dells' area. Here the Winnebago Indians nightly perform their ancient ceremonial dances to the accompaniment of the steady beat of the tom-tom. Only a few miles away is Devil's Lake, a spring-fed lake with no visible outlet. This lake is unusually good for swimming and fishing, and the high wooded hills surrounding the lake add much to the picturesque scenery and are great sport for those who enjoy climbing. A state park with its usual recreational facilities, including a golf course can be found here.

If you are looking for an interesting trip in eastern Wisconsin, the drive north along Lake Michigan from Milwaukee up to Door county, the cherry capital of the world, should be unforgettable at this time. The last week of May is cherry blossom week, and with 6 million trees, this is one of the most concentrated cherry-producing areas in the world. Peninsula Park is in this region and is one of the finest parks in the state; its beautiful wide sandy beach with gradually deepening water and no drop-off makes it unexcelled for swimming and sun-bathing. The park also boasts of a golf course and many well-marked foot paths through the woods for hikers. Washington Island, an Icelandic type of island off the tip of Door County, can be reached from a ferry-boat landing not far from the park.

If "roughing it" in Wisconsin's North Woods is the vacation you have been waiting for, fishing is tops at this time of the year.

The drive up north through the Menominee Indian Reservation is one of the wildest and most beautiful in a state famous for its scenic highways. It is not uncommon to see a deer or a bear as you drive along. The fishing on the reservation itself is restricted to the Indians; to see an Indian at twilight paddling his birch-bark canoe is a picture you will long remember, but anyone may fish on the countless lakes and streams outside the reservation. Wisconsin is the muskellunge capital of the nation, and the Three Lakes area north of the reservation is the place to find them. For the fishing thrill of a lifetime, tangle with a fighting "Tiger Musky," king of all fresh water fish. All other types of fresh water fish also abound in these forest lakes. If you wish to rent a cabin up there, it is best to make reservations in advance.

A word of warning! Be sure and break it off in time to attend the Mil-

(*Continued on page* 39)

With Our Members . . .

Engineers' Week

Early Reports Spotlight Observance As Highly Successful in All Areas

As this issue of the AMERICAN ENGINEER goes to press initial reports are starting to come in indicating a very successful National Engineers' Week observance throughout the country.

Among the first official proclamations of the observance were those signed by Governors Boggs of Delaware, Lausche of Ohio, McKeldin of Maryland, and Kennon of Louisiana and the Commissioners of the District of Columbia.

The members of the Maryland SPE, cooperating with other engineering groups, took part in two special meetings organized as part of the celebration in Baltimore. The first was a joint dinner meeting with the local section of the American Society of Mechanical Engineers, during which three outstanding speakers covered the subject of engineering education. The second event was a meeting sponsored by The Engineers Club of Baltimore for all local groups with Dr. Irving P. Krick, president, Water Resources Development Corp., Denver, as guest speaker.

The Louisiana Engineering Society (not affiliated with NSPE) sponsored a comprehensive program throughout the state with radio and TV shows and special meetings of various engineering groups. Waldemar S. Nelson and W. J. Drawe served as co-chairmen for the Louisiana Engineers' Week project.

In Delaware the celebration represented the joint efforts of ten engineering organizations including the Delaware SPE. Each of the groups sponsored displays relating to engineering accomplishments which were set up with the cooperation of various local businesses. Ernest S. Van Demark, DSPE past president, and Walter Applegate, ASME past chairman, served as chairman and vice chairman respectively of the over-all Engineers' Week Committee.

In Charleston, West Virginia, eleven engineering societies joined forces to provide a week-long schedule of events, and the capitol rotunda was given over to more than thirty industrial exhibits paying tribute to the engineering profession.

Highlighted in the early reports were accounts of the cooperation of many more such industries. In Denver, the Eaton Metal Products Company provided National Engineers' Week car stickers. In Syracuse, N. Y., the Niagara Mohawk Power Corporation gave virtually all of its display space to the National Engineers' Week theme during the full month of February. And in Chicago, Pullman, Inc., gave prominent space to a large Engineers' Week poster in its industrial showroom.

Banquets in recognition of the event were scheduled by the Los Angeles Chapter, CSPE, the Fayette Chapter, PSPE, and the Professional Engineers of Colorado, the latter gathering in Denver being the State Society's annual party. In Rochester, N. Y., the local Chamber of Commerce building was the scene of an inter-Society dinner, which is expected to become an annual Engineers' Week event.

Highlight of the week in San Jose, Cal., was the formal dedication of the new engineering building on the San Jose State College campus, and San Jose and other CSPE members participated in the ceremonies. Also on the west coast, the ABC network carried a 15-minute radio show, produced by NSPE, as a result of arrangements made by Edward G. Lowell of the Pasadena Chapter.

The Fox River Valley Chapter observance in Wisconsin was under the chairmanship of Gordon Meyrick. In Pennsylvania, the Washington County, Harrisburg, and Reading Chapters organized varied radio and TV coverage, industrial displays and other appropriate programs; and in the Reading Chapter a team of speakers visited area high schools.

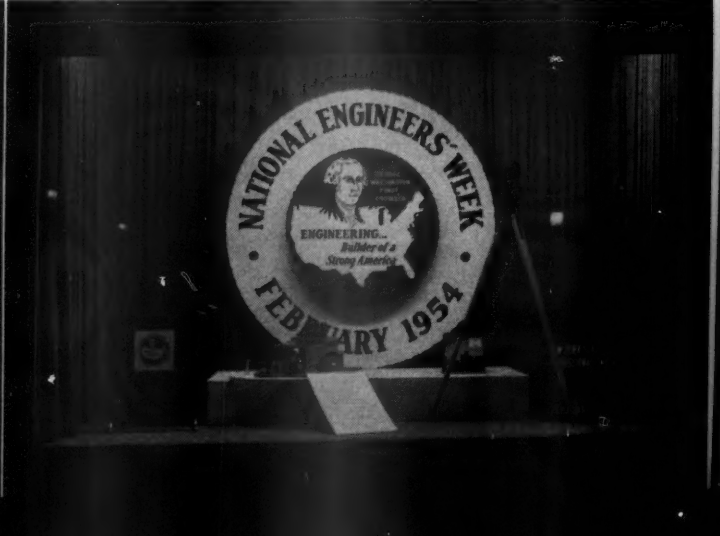
From coast to coast the response of the public, industry, and civic bodies was exceptionally generous as the story of "Engineering—Builder of a Strong America" was brought to the attention of all.

T. Carr Forrest, Jr. Addresses Georgia P.E.'s

The Dinkler-Plaza Hotel in Atlanta, Georgia, was the scene of the tenth annual meeting of the Georgia SPE on February 27. A combination of professional, business, and social events were provided for the engineers and their wives and guests.

A panel discussion on *Recommended Professional Engineer Fee Schedules* was one of the highlights of the meeting, as was the principal address delivered at the annual banquet by NSPE President T. Carr Forrest, Jr. Another event of general interest was a tour and inspection of student exhibits at the Georgia School of Technology.

ENGINEERS' WEEK SCENES—The picture at the left below shows Governor Theodore R. McKeldin of Maryland signing the state's official Engineers' Week proclamation. Watching the governor as he affixes his signature to the document are, l. to r., Col. L. G. Smith, president of the Maryland Society of Professional Engineers, and fellow engineers Stewart Parker, Owen W. Turpin, and Ernest H. Hanhart. The impressive display at the right was arranged by the Niagara Mohawk Power Corporation, Syracuse, N. Y., in cooperation with the Central New York Chapter, NYSSPE.



Kansas Societies Hold Joint Meeting

Members of the Kansas Society of Professional Engineers and the Kansas Engineering Society held a joint annual meeting January 22 and 23 at the Jayhawk Hotel in Topeka. Presiding at the various sessions were Vernon W. Barlow, president of the KSPE, and L. W. Newcomer, president of the KES.

One of the principal topics of business under discussion was the proposed merger of the two groups. No final action was taken, but both societies gave confidence votes to their respective boards of directors and expressed favorable, but unofficial, reaction to a proposed constitution. Further study is, therefore, being given to the merger by a special joint committee. An official vote may be taken later in the year, but officials of both organizations pointed out that considerable time would be necessary to work out complete and final details.

Principal guest speaker for the two-day convention was T. Carr Forrest, Jr., president of the National Society of Professional Engineers. Another speaker was C. Y. Thomas, an NSPE vice president, and a member of both the KSPE and KES.

The KES session was also highlighted by the election of new officers. Walter G. Johnson of Topeka, engineer of secondary roads for the Kansas State Highway Commission, was chosen as president to succeed L. W. Newcomer. Mr. Johnson is also a member and national director of the KSPE, and he has been serving as chairman of the KSPE-KES merger committee.

The convention was open to all engineers in Kansas, regardless of their membership or nonmembership in either group.

Texas P.E.'s Convene In Corpus Christi

Members of the Texas Society of Professional Engineers met for their 18th Annual Convention in Corpus Christi, January 27-30. Registration headquarters for the event were located in the Robert Driscoll Hotel; but several events were held at the Nueces Hotel, and the Friday luncheon, at which Elgin B. Robertson, past president of the TSPE, was guest speaker, was held at the Plaza Hotel.

T. Carr Forrest, Jr., NSPE president, was the featured speaker at the Friday evening banquet and dance, which was also highlighted by the installation of new officers. J. Neils Thompson, outgoing president, officiated at the installation ceremonies. The newly-installed Texas officials were: Frank T. Drought, president; J. S. Hudnall, first vice president; J. B. Dannenbaum, second vice president; Noah E. Hull, national director; and Hollis Harris and W. H. Sindt, directors-at-large.

Business and professional sessions covered such topics as registration trends, increased operating funds for the Registration Board, engineering practice by corporations, improved public relations, and professional unity.

Charles R. Waters Receives Highway Award

Dr. Charles R. Waters, district engineer, New York State Department of Public Works, Buffalo, and a prominent member of the Erie County Chapter, NYSSPE, has received the Roy W. Crum Award for distinguished service in the field of highway research. The presentation was made at a recent meeting of the Highway Research Board, which sponsors the award, held at the National Academy of Science in Washington, D. C.

Dr. Waters has won nationwide recognition for his work in the highway field, particularly through his contributions as a member of the National Committee on Uniform Traffic Control Devices for Streets and Highways. He has received numerous other honors including a special certificate of recognition from the Erie County Chapter.

Dr. McEachron Dies; Memorial Fund Planned

Dr. Karl B. McEachron, distinguished member of the Massachusetts Society of Professional Engineers and NSPE, died January 24 at the Pittsfield, Mass., General Hospital following an operation.

A graduate of Ohio Northern and Purdue Universities, Dr. McEachron was perhaps best known for his lightning research work with the General Electric Company, with which he was associated in various capacities from 1922 until the time of his death. At the New York World's Fair in 1940, he received the B. F. Goodrich Award for distinguished service in the lightning research field. He designed the spectacular show of man-made lightning that astonished visitors at the same fair.

In his memory an award fund is being sponsored by the community of Pittsfield, where he was extremely active in civic affairs. It is planned that an annual award will be made to a deserving senior of the Pittsfield Technical High School. Anyone wishing to contribute can send his check, payable to the "Karl B. McEachron Memorial Fund," to J. Howard Fryer, treasurer, Berkshire County Savings Bank, Pittsfield, Mass.

. . . more news on page 35

KANSAS CONVENTION—At the left below NSPE President T. Carr Forrest, Jr., addresses the joint KSPE-KES meeting (see story above), while W. W. Mains, president, Topeka Chapter, KSPE; L. W. Newcomer, KES outgoing president; and Vernon W. Barlow, KSPE president, listen attentively. The picture at the right shows KES officers—Front row: Dr. R. F. Mores, vice president; L. W. Newcomer, outgoing president; Walter Johnson, newly-elected president; and Guy E. Gibson, Jr., secretary-treasurer. Back row: C. Frank Virr and Don C. Vickers, KES directors.

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Directory Continued on Next Page . . .

C. B. Broschart Writes "Young Engineer" Book

The Young Engineer by Charles B. Broschart, a book of simplified science and engineering for boys and young men, has just been published by the Exposition Press, Inc., N. Y.

The author, who is a member of the Pennsylvania Society of Professional Engineers, describes the new volume as "an attempt to help all 'questioning' sons and 'answering' fathers." There are 182 illustrations by the author, a veteran of more than thirty years of engineering experience, and the subjects covered range from natural phenomena to television.

Mr. Broschart, who was prompted to write the book by the questions of his own son, is a graduate of Pennsylvania State College, where he received a B.S. in Electrical Engineering. He is president of the Bradley Company, Inc. of Philadelphia; and in addition to his PSPE and NSPE membership, he also belongs to the AIEE.

Further information about his book may be obtained from the Exposition Press, Inc., 386 Fourth Avenue, New York 16, N. Y.

Texas Engineers Honored

Walter E. Seaholm, a prominent member of the Travis Chapter, TSPE, and city manager of Austin, was named "Mr. Front Page of 1953" by *The Austin American-Statesman*. The honor is conferred annually on the Austin citizen most frequently making important news during the year. One of the 1953 headlines that resulted in the award was Mr. Seaholm's selection by the Travis Chapter as its outstanding engineer last spring.

Another member of the chapter, Vice President J. William Allen, recently was named "Jaycee of the Month" by the Austin Junior Chamber of Commerce. Mr. Allen is an architectural engineer with the City of Austin.

IDAHO CONFEREES—Present at the recent Idaho SPE annual meeting were (l. to r., below): NSPE president T. Carr Forrest, Jr.; Governor Len Jordan; T. E. Roach, who represented the AIEE; and ISPE President Jay Painter.

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Lafayette, Ind, P.E.'s Meet With Land Surveyors

Members of the Lafayette Chapter, Indiana SPE, held a joint meeting recently with the Indiana Land Surveyors in conjunction with the annual Land Surveyors' Conference convened at Purdue. Carl R. Anderson of the Aluminum Company of America's Lafayette Works was guest speaker at the meeting.

Gordon B. Thompson is president of the Lafayette Chapter.

Investment Lecture In Youngstown, Ohio

The February meeting of the Mahoning Valley P.E.'s, held in Youngstown, O., featured a lecture on investments by Carl Dennison, a partner in the stock brokerage firm of Butler, Wick & Co. Mr. Dennison's lecture was supplemented with sound movies of the New York Stock Exchange.

Expansion

(*Continued from page* 17)

placed by longer ones; and then the intermediate columns were taken down. The "shoring trusses" remain in the structure to support the saw-tooth roof and the crane beams.

During the erection of the new assembly bay and a hangar, a newly concreted ramp area was used for the fabricating of the camelback roof truss assemblies. Jigs were positioned on the ramp and the trusses were welded in them in the prone position, in halves, and later lifted into position with cranes.

Moving In

COMPLETION of the structures ended one major phase of the project and introduced another, the move into new facilities, again without interrupting production.

Moves from existing facilities into the new additions had to be planned with precision. Schedules were set up with all moves of departments or sections broken down into individual projects and scheduled by day and hour to avoid conflicts, with estimated times required to make the moves being given to all departments concerned.

Now C-119 Flying Boxcars are moving down the new and improved final assembly line which was transferred from the former production area to the new assembly bay in less than a month under one of the industry's most unique relocation programs.

While this move required numerous major plant changes and was executed during a period when Fairchild was facing its heaviest delivery schedules, production continued uninterrupted. The company was, in fact, able to deliver the first of its new C-119G series three months ahead of schedule.

Here again the successful mass shift of location and concurrent improvement of manufacturing equipment were facilitated by detailed advanced planning and close coordination of Fairchild's industrial engineering and tooling departments, as well as around-the-clock cooperative efforts on the part of Fairchild employees.

Long before the move, down-to-the-hour schedules were established, and additional production equipment necessary for the new assembly line was fabricated ahead of time to avoid possible delays in the relocation plan.

As soon as the production bay was completed, the relocation program was set in motion, working from the first station at the head of the line to the final position at the hangar door. Most major transfers were made on weekends, but smaller moves were carried out during regular production work shifts.

As soon as a group of assembly line workers finished the airframe component at their designated station, overhead cranes maneuvered the heavy equipment from that station to a previously-planned new position in the modern production bay. Everything from wing platforms to employees' tool boxes was transferred to the new assembly line.

Practically en route, such items as production platforms, desks, and tool cribs were repainted before being positioned in their new places. Equipment which could not be repainted fast enough in the plant paint shop received a new coat of color on the spot.

Since this move was made progressively, both the old and new assembly lines were operating simultaneously, side by side. As the old line shrank, the new one grew longer until all new stations were in full production. The changeover was so minutely planned and well executed that not a single airplane fell behind Air Force schedules.

The transfer of lines necessitated relocation of the center section and nacelle mating fixture, and the unorthodox method of moving it was one of the most novel features of the entire rearrangement program.

In relocating major assembly fixtures, jig and assembly generally are moved separately. Since the jig in this case consisted of three distinct parts—one for each nacelle and a third for the center section—it normally would have to be transferred in three pieces.

Fairchild's tooling, industrial engineering and production engineering departments worked out a new method under which the three parts were fastened together with steel girders and the assembly remained in place in the fixture. These girders holding the jig and its assembly were lifted with overhead cranes. Then the entire load, weighing about 34,000 pounds, was carried 300 feet, turned 180 degrees, and lowered into position in the new line.

UNDER conventional moving methods, this would have required nearly 300 man-hours for realignment, and the jig would have been out of commission for five days. With Fairchild's system, however, only a few thousandths of an inch in alignment were lost. After six hours of time and 40 man-hours of work, the fixture was back in production.

Conference-table improvisation, it was found, can bring about major contributions to the design of a plant. Consider the case of the north addition to the Fairchild facility, a large hangar. This steel framework structure was designed by the program architects, with bowstring trusses like the main facility, to provide a framework of great strength without interior vertical supporting columns.

But in going over the plans, Fairchild engineers were faced with the old bugaboo of hangar floor trench design for service lines.

In conventional systems, service lines are carried in wide trenches 15 to 24 inches deep, which must be covered with plates, matting or other material to permit wheels to roll over them.

At the author's suggestion, the architect incorporated service channels for both high and low potential electric service lines and air hoses as an integral part of the floor.

Six parallel channels were spaced at equal distances apart, running the entire 250 foot width of the hangar and providing flexible service line coverage of the hangar area.

The channels were formed of hat-type sections of 10 gauge steel bedded in the concrete flooring. They are only one inch wide at floor level, but are three inches wide at the bottom, with a depth of two and one half inches.

This installation permits vehicles with even very small wheels to roll over the channels with no covering required. Air hoses and electric lines, placed in the narrow troughs, keep the floor from becoming cluttered. The channels are easily cleaned with an ordinary broom, and little water can collect in them.

A major advantage of the system is that it completely obviates the problem of gases collecting in deep floor trenches, with attendant explosion and fire hazards. Regular disconnects may be used with the Fairchild system, instead of the expensive vapro-proof disconnects required for conventional trench wiring.

Among other features incorporated in the program as a result of the collaboration between Fairchild production and engineering experts and representatives of the architectural and contracting firms was the floor design for the new assembly bay.

An example of top-notch plant engineering, the floor uses concrete to provide the maximum in durability and contribute to maximum efficiency and service in the building.

The floor was made of gleaming white anti-hydro cement topping. It was chosen for the 165,000 square feet of

surface it covers for two principal reasons: it has good light reflecting qualities and it can be easily maintained and cleaned.

Good light reflecting qualities were important in the floor because the entire building has no windows or skylights, hence depends entirely on artificial lighting.

This floor would be easy to maintain . . . no painting would be required, and the cement topping has been found to be dust free.

Utility trenches were spaced at frequent intervals in the floor to provide for distribution of essential services.

The floor was designed to withstand the heaviest of loads, having a compressive strength of 8,000 psi, in contrast to the 2,500 to 4,000 psi factor for most factory flooring. Fairchild's production airplane, the C-119, weighs under 35 tons, but if and when the company goes into production of very heavy aircraft, its facility will be able to handle them. To provide a more flexible overall layout system, it was decided to cement most machinery and fixtures to the new floor instead of the customary bolting.

THE Fairchild industrial engineering department planned the utilization of the new areas, and plant operations carried out the moves into them. Industrial engineering contributed such ideas to the project as an overhead crane system in the new building which was designed to interlock with the crane system in the original assembly plant to provide crane travel at all points over the 450 foot wide by 825 foot long area encompassed by the two plants.

The system was made up of five cranes in all, any one of which may travel anywhere in the two buildings. Each crane is equipped with one 10-ton and 2 two-ton hooks, with the high ceiling providing a clear height of 40 feet from floor level to the highest point of the crane hooks.

These were the problems encountered and solved by our engineers and production specialists in completing this major plant expansion program. Part of the success of these projects may be attributed to the know-how of key personnel with varying engineering viewpoints—production, construction, maintenance, tool design, and industrial engineering, all were represented in the round-table meetings called to iron out problems as they arose.

These were the same men who helped devise and perfect the famed "Hagerstown System" for mass producing military trainers almost overnight in the early days of World War II, the engineers who were responsible for the split-second planning that attracted national attention when Fairchild began producing Flying Boxcars on a peacetime basis with a firm program for immediate conversion to war-time delivery schedules.

Planning, engineering cooperation, and ingenuity have enabled Fairchild Aircraft to evolve from a converted garage to one of the largest eastern aircraft firms in the nation's current defense picture.—*End.*

Meeting

(*Continued from page* 31)

waukee meeting by June 9; a top-notch program is being planned for you.

From Cheese to Christmas Trees—That's Wisconsin!

By William F. Steuber, P. E., Southwest Chapter, Wisconsin SPE

WISCONSIN in June is beauty wherever you look, a hand-picked vacation spot whether your desires are cabin cruising, golf, fishing, bird watching, pleasure driving, rock climbing, color photography, or just plain loafing. Milwaukee, the site of the annual meeting of the National Society of Professional Engineers on June 9 through 12, is within easy access of all of it. Wisconsin's industry, its farming, its wilds are all within a day's drive of Milwaukee. What's more, Wisconsin has not separated its variety by distances. While there are areas where one way of life predominates over the others, there is contrast everywhere.

Rugged Devil's Lake, a gem of geology, lies in a dairy county. A film on waterfowl in the wild, and winning Audubon Society sponsorship, was made within sight of the stacks of Milwaukee's heavy industry. University of Wisconsin professors at Madison put their notes away after the last lecture of the day and still have time to go out on Lake Mendota to get a bag limit of jumbo perch before dinner. The Menominee Indians on their reservation north of Shawano are the state's present lumber barons, prosperous under excellent forest management that perpetuates an island of white pine as big as a county and surrounded by agricultural lands.

Wisconsin's people love green and wildlife. Current state-wide hobby is to find a piece of rocky or sandy land that doesn't come up to Wisconsin's high standard for agriculture and plant it to trees, usually conifers. Fast growing, the 6-inch setouts become merchantable Christmas trees in four years, posts in fifteen, pulpwood after twenty, and top-grade lumber by the time the grandchildren take over. On a modest scale, land and planting can be a positive reality for as little as a hundred dollars. Farmers, school teachers, boys' clubs, lawyers, bankers, engineers, and corporations are busy putting acreage into pine that some day will rival the stand Wisconsin had when the first voyageurs paddled their canoes up its rivers.

The State Conservation Commission nurseries alone supply these green-thumb artists with over 25 million transplants a year. Patches of new forest are cropping up in all sections of the state, a couple of rows at a field edge here, two acres there, and perhaps a full section taking over a once sandy flat. Those who got into tree planting as little as six years ago can now walk in proud possession among rustling pine that stands well over their heads. All this new greenery provides wonderful game cover, and an excellent extra dividend is a rapid rise in game and songbird population.

Wisconsin cheese is marketed all over the country. You pick it up every week at your own grocery, but don't let that deny you the adventure of branching off on a side road, past a herd of Holsteins feeding on a hillside, and finding your own cheese factory where the cheesemaker will serve you a taste off the side of his slicing knife before you buy. And by the way, you can take to those side roads without a worry. Our milk has to reach its market in any weather, every day. Truck mileage for farm pickup of milk each day in Wisconsin totals more than twice around the world at the equator. Only two other states in the union keep their local roads in better repair than Wisconsin—and they are both of a size scarcely greater than one of Wisconsin's larger counties.

We here in Wisconsin are proud of the things vacationists in our state can do and see, but by far our best boosters are those who take back their own report.

With our carpet of green out, Wisconsin bids Welcome to the National Society of Professional Engineers at its annual meeting at Milwaukee, June 9 through 12, 1954.

Strictly Business

Personalities . . . ROBERT VON ROTZ has been appointed chief engineer of the TUTHILL PUMP COMPANY, Chicago, according to H. T. KESSLER, president . . . MALCOLM M. COSTON has been named manager of the Process Equipment Division, RODNEY HUNT MACHINE CO., Orange, Mass. . . . VINCENT T. MANAS is now associated with the Plumbing Division of J. A. ZURN MANUFACTURING CO. of Erie, Pa. as special consultant on plumbing engineering and also in charge of sales in the Washington, D. C., area. . . . DR. WARREN C. LOTHROP has been appointed a vice president of ARTHUR D. LITTLE, INC., Cambridge, Mass. . . . ROBERT N. SHELEY has been promoted to the position of chief architectural engineer for OWENS-ILLINOIS GLASS CO., Toledo, O. . . . GEORGE W. ALEXANDER is the new assistant to the operations manager of DRAVO CORPORATION'S Engineering Works Division. . . . F. GORDON BOROWSKY has been elected president of the GEORGE K. GARRET COMPANY, INC., Philadelphia; A. G. BOROWSKY, the former president, was elected chairman of the board. . . . The appointment of R. B. THOMPSON as assistant general manager of manufacturing, AMERICAN CAN COMPANY, has been announced by G. W. REESE, general manager of manufacturing.

Mr. Von Rotz

Mr. Nielsen

M. NIELSEN, vice president of THE BABCOCK & WILCOX COMPANY, has been elected a member of the board of directors and placed in charge of the firm's Boiler Division, according to an announcement by ALFRED IDDLES, president. W. D. SULLIVAN has been elected a vice president of the company and is now in charge of the Boiler Division's manufacturing department, while J. P. CRAVEN has been named superintendent of the Erection Department. . . . JACK B. BOND has been appointed assistant general manager of the Crusher, Screen, and Process Machinery Division of the NORDBERG MANUFACTURING COMPANY, Milwaukee; and HOWARD M. ZOERB has become divisional consulting engineer. . . . J. H. RUSKIN has been elected executive vice president of the CHEMICAL CONSTRUCTION CORPORATION, subsidiary of the AMERICAN CYANAMID COMPANY. G. I. SEYBOLD and MARTIN DE SIMO were elected vice presidents of the construction firm, and THOMAS P. FORBATH was named assistant to the president. . . . ROBERT J. STRASS, Milwaukee design and construction engineer, has announced that HARRY A. LOSER is now affiliated with his staff.

WILLIAM DOWD is now associated with the CARVER PUMP COMPANY, Muscatine, Iowa, as a consultant. . . . MARTIN W. CHANDLER has been appointed head of the Architectural Department of THE KULJIAN CORPORATION, engineers and constructors of Philadelphia. . . . ROBERT D. MUDD, vice president of FRUIN-COLNON CONTRACTING COMPANY, St. Louis, has been elected to the company's board of directors. . . . DR. FRANKLIN D. JONES has joined the consulting staff of GENERAL INDUSTRIES, INC., Philadelphia engineering firm, according to an announcement by EARL D. STICKLEN, president. . . . C. BENSON WIGTON, president and treasurer of WIGTON-ABBOTT CORPORATION, designers, engineers and constructors, Plainfield, N. J., has been elected a member of the board of directors of the NATCO CORPORATION (formerly NATIONAL FIREPROOFING CORPORATION). . . . DUDLEY A. BURNETT and MARSHALL O. NYSTROM have been named district managers of the Construction Machinery Division, CLARK EQUIPMENT COMPANY. Mr. Burnett will cover the South Atlantic Coast and New England districts, while Mr. Nystrom's assignment will include eleven western states and Oklahoma and Texas.

►

New Firms and Offices . . . A new technical information firm, MILES-SAMUELSON, INC., has been established in New York City with offices at 1239 Broadway. The company maintains a staff of mechanical, electronic, and aeronautical engineers, as well as other scientists and technical writers and illustrators. . . . A Chicago sales office, staffed with factory-trained engineers, has been opened by the BARRY CORPORATION of Watertown, Mass., manufacturers of shock and vibration isolation equipment. SHELDON E. YOUNG, former manager of Barry's Field Engineering Service, has been appointed manager of the new office. . . . L. C. MARSCHALL, executive vice president of SOLA ELECTRIC CO., Chicago, has announced the opening of a branch office for specialty transformer sales in Los Angeles with RICHARD S. SMITH as district sales engineer.

Mr. Young

►

Operational Expansion . . . H. E. WIDDELL, president of ARTHUR G. MCKEE & COMPANY, Cleveland designers and builders of blast furnaces, open hearths, and petroleum refineries, has announced the formation of a new industrial engineering division for the purpose of handling engineering contracts for industries other than steel and petroleum. DAVID M. CHECKLEY has been named general manager of the new division. . . . PANELLIT INC., designers, engineers and manufacturers of modern industrial automatic control and information systems, has begun construction on a new plant in Skokie, Ill., as the first step in a major expansion and consolidation program. . . . More than $2.5 million will be spent during 1954 to rearrange and expand the WESTINGHOUSE ELECTRIC CORPORATION'S Electric Appliance Division plant in Mansfield, Ohio, according to J. H. ASHBAUGH, vice president.

►

Industrial Exhibitions . . . The 1954 METAL POWDER SHOW will be held in conjunction with the tenth annual meeting of the METAL POWDER ASSOCIATION at the Drake Hotel, Chicago, Ill., April 26-28. . . . The seventh ELECTRICAL INDUSTRY SHOW, sponsored by the ELECTRICAL MAINTENANCE ENGINEERS ASSOCIATION OF SOUTHERN CALIFORNIA, has been slated for the Shrine Exposition Hall in Los Angeles, April 1-3, according to Director JOHN J. SINGLETON.

Winne

(*Continued from page* 13)

effort. But it is a reason for us to *clarify* our moral objectives, *face* up to the responsibilities that travel in the wake of technical progress and *win* public understanding.

In this world of uncertainty and fear, the public wants to blame someone, and it is looking squarely at the scientist and the engineer. People are afraid of the hydrogen and the atomic bombs and the possibilities of biological warfare. They tend to move to the faulty conclusion that the men who make such weapons are possibly the villains. They think that perhaps we engineers have at last outsmarted ourselves by planting the seeds of universal destruction.

Now what can we as engineers do about changing that attitude? For one thing, in the day-to-day contacts of our private or public life, we can point out the fallacy of such thinking. We can explain the true significance of scientific progress as it really bears on our destiny as free men.

Boil this down and it becomes a problem of communication and of human relations. I think that perhaps we engineers have tended to become too concerned with material things, with scientific processes and developments, rather than with the human aspects of such developments.

Perhaps we should become more concerned with the reaction of the rest of the people in the world to what we have been producing for them. Perhaps we should think of the social significance of our engineering accomplishments. Perhaps we should spend more time in explaining our viewpoint and what we are actually trying to accomplish in terms of making this a better world in which to live. Not *perhaps*, but *certainly* we should!

Today engineers are playing an ever increasing role in administration and management. Here they have an opportunity to explain the very real interest that engineers have in the welfare of the people. That is an obligation to the people that we engineers must not forget—that of explaining our motives.

If we can get credit for good intentions in spite of our occasional mistakes, then I'm sure that we will gain public confidence and understanding for what we are trying to do to improve the world in which we live.

As I see it, we must correct the false notions the public may have about men of science and engineering and come up with the true significance of scientific progress as it really bears on our destiny as free men. It is important for engineers and scientists to do more than just stand by to be explained and defended.

As citizens we must pick up our tools and use them to help shape our own destiny. In fact, engineers and scientists have more than an ordinary obligation because we are members of an estate with somewhat higher responsibilities than the average citizen.

We must defend our freedom to push ahead on a scientific front wherever it may lead us. We can't sacrifice any of our liberties because liberties are all interrelated. The professor who scoffs at business freedoms undermines his claims to academic freedoms. The businessman who fails to support freedom of speech is endangering his freedom of enterprise. We must support all vital freedoms in a democracy.

Only in an atmosphere of *complete freedom* are the engineering accomplishments so necessary to this country's continued advancement possible. As engineers and scientists I suggest that we must *improve our human relations* and take note of what the public is saying about us. We must explain the true significance of our work and gain better public understanding.

That will lead to an informed public. And an informed public is necessary to our continued vitality and freedom as engineers and businessmen. Abraham Lincoln with simple eloquence stated the case for public information many years ago when he said:

> "With public sentiment, nothing can fail; without it, nothing can succeed. Consequently he who molds public sentiment goes deeper than he who enacts statutes or pronounces decisions. He makes statutes and decisions possible or impossible to execute."

Someone was quoted the other day as saying this is an age of unpredictables, both social and political unpredictables. It is these *very* unpredictables that make this *both* the age of *opportunity* and the age of *anxiety*. In such a time, public opinion is very volatile. In such a time, all of us must work for public understanding.

Let me try to make my last point crystal clear. Our future will in a large measure be determined on how well we develop this public understanding to keep pace with our scientific achievements.

Now to sum up: If we are able to make progress in, first, continuing our constant research and inventiveness; second, in accelerating our communication of our useful ideas; third, in attracting courageous investment to make our progress possible; and finally, in gaining and maintaining public good will and understanding for our efforts, I am convinced that we will live up to our engineering heritage.

If we can do these four things, we engineers will be counted as a vital group in contributing to our nation's future *strength* and *prosperity* in the years ahead. We dare not fail in this important assignment.—***End.***

State Presidents' Conference Is Scheduled

The 1954 State Presidents' Conference has been scheduled for the Hotel Webster Hall, Pittsburgh, Pa., March 19 and 20, according to Paul H. Robbins, NSPE executive director.

The purpose of the meeting is to assist State Society presidents in the administration of their organizations' activities by providing the opportunity for them to exchange ideas with other state presidents, discuss national programs with the national officers and committee chairmen, and obtain additional first-hand information on general professional matters.

Guest speaker at the State Presidents' Banquet will be A. C. Monteith, vice president in charge of engineering, Westinghouse Electric Corporation. Mr. Monteith has recently been nominated as 1954-55 president of the American Institute of Electrical Engineers.

Engineering Jobs Open In Frederick, Md.

According to a recent announcement by John E. Thompson, civilian personnel officer, Headquarters, Camp Detrick, Frederick, Maryland, there are a number of positions open on the Camp Detrick staff for qualified persons trained in the fields of chemical, mechanical, and electrical or electronic engineering. Further information on the positions can be obtained from Mr. Thompson.

What's New

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NEW MODEL HYDROLIFT — Item 1

Lift Trucks, Inc., announces the Hydrolift "HHP" specifically designed to handle narrow skid platforms for tiering to heights of 108" in crowded areas. Outstanding feature is powered telescopic lift for tiering up to 2000 lbs. Operating in aisles where space is at a premium, the truck is versatile—handling skid loads (both horizontal and vertical movement) and positioning dies, loading trailer trucks, etc.

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"CHEMI-DRAIN" FOR CORROSIVE SEWAGE — Item 2

"Chemi-Drain," an entirely new kind of channel pipe designed by Dow Chemical Co. and manufactured by the Logan Clay Products Co., is now available for sloping drains and gutters in chemical plants and other corrosive service. Made of vitrified clay for permanent protection against corrosion by acids and other chemicals, "Chemi-Drain" is manufactured in double sections with five grooves or "kerfs" in each side so that the builder can divide the double sections into single sections of any desired depth from four to 12 inches.

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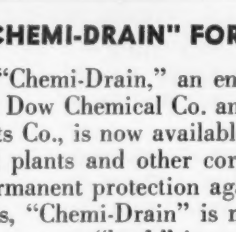
VIBRATION MOUNTING — Item 3



William J. Hacker & Co., Inc., agents for the Reichert Research Metallograph, use a special mounting system designed for their camera microscope by Robinson Aviation, Inc., employing the latest principles of vibration control. Incorporating an all-steel cushioning material (Met-L-Flex), this mount is said to be so sensitive it will absorb every kind of vibration and keep the unit free-floating and motionless at all times.

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LP HAND MODEL BLOW TORCH — Item 4

Introduction of a new LP (Liquefied Petroleum) hand model blow torch with disposable fuel tank has been announced by The Turner Brass Works. Complete with all-brass burner and fittings, it is designed for soldering, light brazing, similar job and shop use where heavy duty equipment is not required. No filling is necessary. Entire fuel tank is replaced by a refill unit as needed. Features include factory-set pressure relief valve, wide-range positive-control flame adjustment, I.C.C. approved heavy-gauge large-diameter tank. Compact in size (tank measures 2⅞" diameter x 9-9/16" high).

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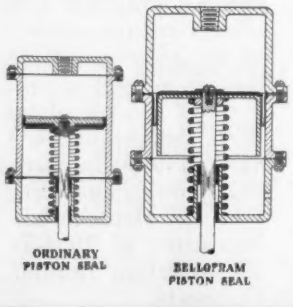
BELLOFRAM PISTON SEAL — Item 5

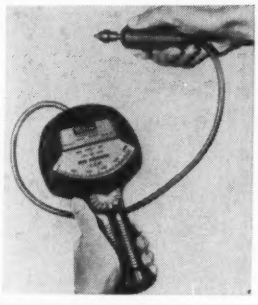


Although unlike conventional bellows and diaphragms, Belloframs provide a simpler, better and easier way of performing similar functions. "Bellofram" is a word coined by combining "bellows" and "diaphragm." It denotes long stroke, deep convolution, constant area diaphragms with increased flexing life and extremely low spring gradient. Exceptionally responsive to small changes in pressure, Belloframs are admirably adapted to precision instrument applications by designers and engineers.

This column describes new products of general interest to professional engineers. For further information, fill in the coupon provided and mail to the AMERICAN ENGINEER.

EASY TO READ HAND TACHOMETER — *Item 6*

Confusion and reading errors are minimized, when measuring speeds with the new Metron Hand Tachometer, by a novel thumb operated range selector which automatically changes the scale numbers for each range. The same mechanism also brings into view the correct number of R.P.M. per scale division. The extra long scale is subdivided for maximum readability. Other features: sustained high accuracy; long life; low operating torque; rapid response; permanent lubrication; and rugged but light weight construction.



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LIGHTWEIGHT ALUMINUM ROOFING — *Item 7*

In answer to the growing demand in industry for a maintenance-free metal roofing material of thinner gauge, Aluminum Company of America is enlarging its line of industrial roofing materials with the addition of a new, lightweight corrugated aluminum sheet. Made of the same durable high-strength alloy as the standard .032 in. material, the new Alcoa Aluminum Corrugated Industrial Roofing and Siding product is only .024 in. thick.

This lightweight product will fill the need where narrow spans in the roof support structure do not require the extra high beam strength of the .032 in. material.

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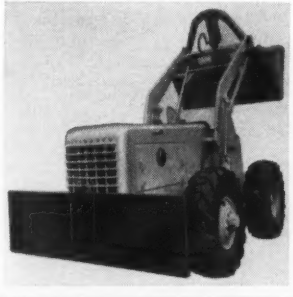
TOWING AND PUSHING ACCESSORIES — *Item 8*

The Frank G. Hough Co., has announced two useful pieces of accessory equipment to increase the usefulness of its Model HM 4-wheel-drive "PAYLOADER" Tractor-Shovel. One is a wide pusher plate of heavy rolled steel for rear-mounting so that the machine can push stalled trucks and other equipment and spot railroad cars. This pusher plate also includes a retractable towing link, so that this big 1½ cu. yard tractor-shovel can tow, haul or skid loads.



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PAPER FOR TWO-SIDED PHOTOCOPIES — *Item 9*

Photocopies can now be made on both sides of a single sheet of paper through the development of a new duplex copying paper. The Apeco Duplex Paper has just been announced by American Photocopy Equipment Company. This paper has been designed especially to work with the Apeco one-unit dry photocopy machine —the Systematic Auto-Stat.

The new Apeco Duplex Paper is made to handle letterhead, legal and book page size copies, as well as larger copies up to 11" wide, any length. There is no limitation as to the type of paper, documents or originals that can be copied regardless of whether the original is on opaque or transparent paper.

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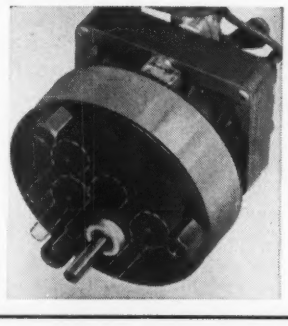
NEW OFFSET DRIVESHAFT ON MOTORS — *Item 10*

A new adaptation of the Gleason-Avery Series 500 induction motors makes it possible to mount the small fractional hp units in hard-to-reach places. An offset drive shaft has been built into the unit. By redesigning the gearbox, the manufacturer has succeeded in bringing the final shaft out of the gear housing at any one of five different locations, including, of course, the standard power takeoff in the center of the system.



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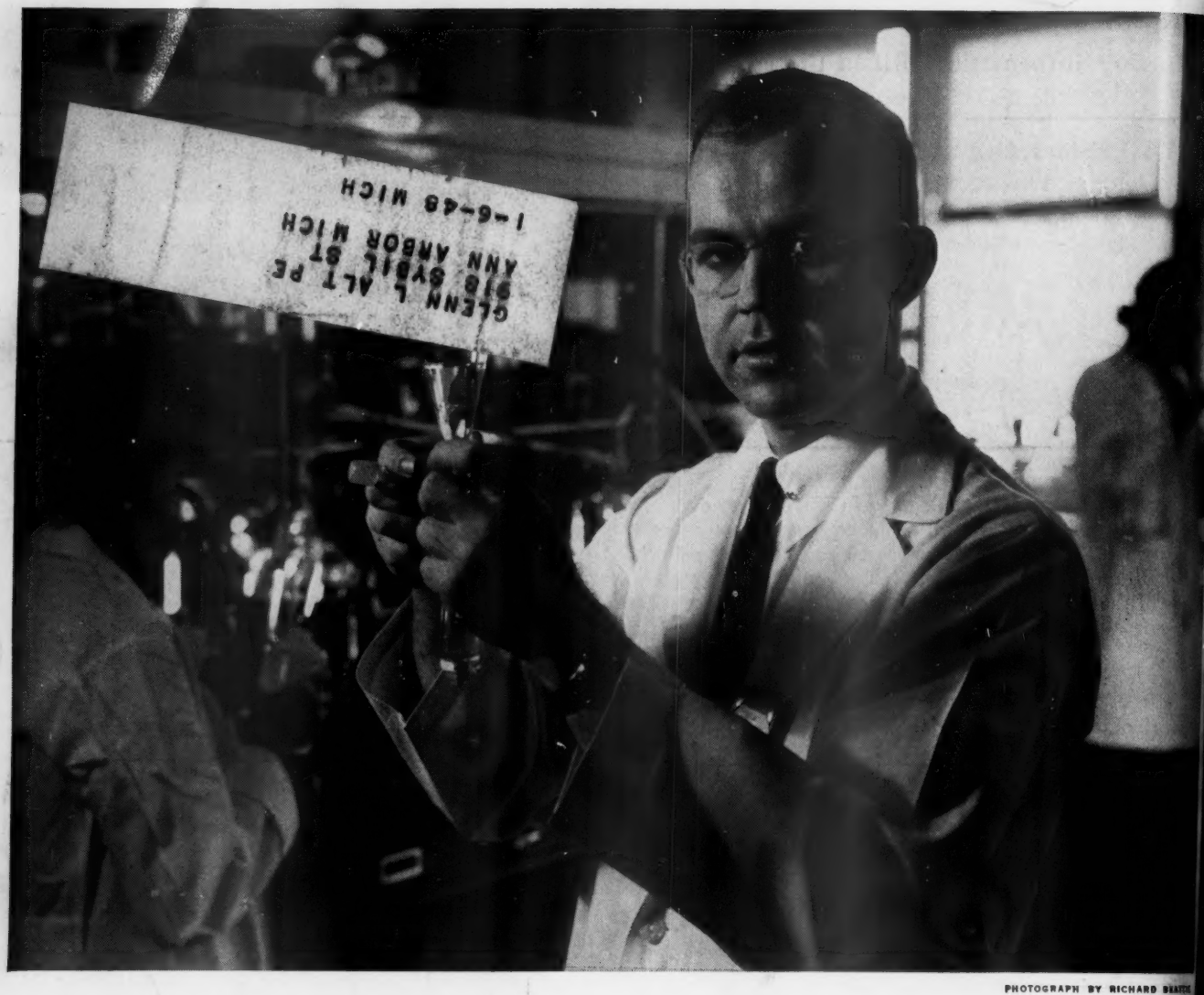

PHOTOGRAPH BY RICHARD BEATTIE

What we still don't know about cancer

—and one of the reasons why

IN THE PAST FEW YEARS, our knowledge of the nature of cancer, and how to treat it, has grown encouragingly. Patients, who would have been considered hopeless cases even five years ago, today are being completely cured. And even those who apply for treatment too late can usually live longer—and less painfully—because of modern palliative treatment.

All the same, there have been defeats as well as victories. We do not know—to take a single example—why so many more men are now dying from cancer of the lung. In 1933—just twenty years ago—lung cancer killed 2,252 men; in 1953, some 18,500. That's a great increase—which even our expanded population, and other known factors, can't possibly account for in full.

Well, why haven't we found more of the answers to cancer?

Not only because cancer is an immensely complex problem: difficult to diagnose, and difficult to treat; challenging to the best research minds.

All that is true enough. But there is another reason: *we do not* have enough money.

Last year your gifts to the American Cancer Society were more generous than ever before. But they were not enough.

You gave the Society almost twenty millions to fight a disease that—at present death rates—will kill twenty-three million living Americans.

Less than one dollar for each American destined to die from cancer. Much more is needed for research, for education, for clinics. Won't you please do *your* part . . . now?

American Cancer Society

Cancer
Man's cruelest enemy
strike back
Give

GENTLEMEN:
☐ Please send me free information on cancer.
☐ Enclosed is my contribution of $..... to the cancer crusade.

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